Base patel panel

Ch 1

Audio in (up)	–	grn/wh – wh/Grn
Audio out (down)	–	wh/Bl – Bl/wh
COR	–	Brn/Rd – Rd/Br
PTT	–	Gry/wh – wh/Gry

Ch 2

Audio in (up)		Brn/wh – wh/Brn
Audio out (down)		Org/wh – wh/org
		Rd/Gry – Gry/Rd
COR		Rd/Blu – Blu/Rd
PTT		

Aux COR	B	Org/Blk	Blk/Brn
	A	Blu/Blk	Gry/Blu
		Grn/Rd	Rd/Grn
Aux PTT	A	Org/Rd	Rd/org
	B		

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Hulm, Peter. A Strategy for the Seas. UNEP: International Printing Co., 1983.

Kochen, R.L. Decontamination of Johnston Island. Washington, D.C.: U.S. Government Printing Office, (February 1986).

Need one more source.

Pr		Pr	From	
4	Red/Brn - Brn/Rd,	RA44	COR	1
1	Blu/Wh Wh/Blu 2	RA41	Aud o	1
3	Brn/Wh - Wh/Brn 3	RA42	Aud in	1
5	Gry/Wh - Wh/Gry 4	RA43	PTT	1
11	Blu/Blk/Gry/Blu 5	RA46	Aux COR A	
	6	RA45	phone	

Punch Block

Pr	fx	
1	Audio up to hill	Ch 1
2	Audio from Admin	Ch 1
3	PTT	Ch 1
4	COR	Ch 1
5	Aux ~~PTT~~ COR A (reset line)	
6	Audio up to Admin	Ch 2
7	Audio from Admin	Ch 2
8	~~PTT~~ COR	Ch 2
9	~~COR~~ PTT	Ch 2
10	Aux ~~COR~~ PTT ~~A~~	
11	Aux ~~COR~~ PTT B	
12	Aux COR B	

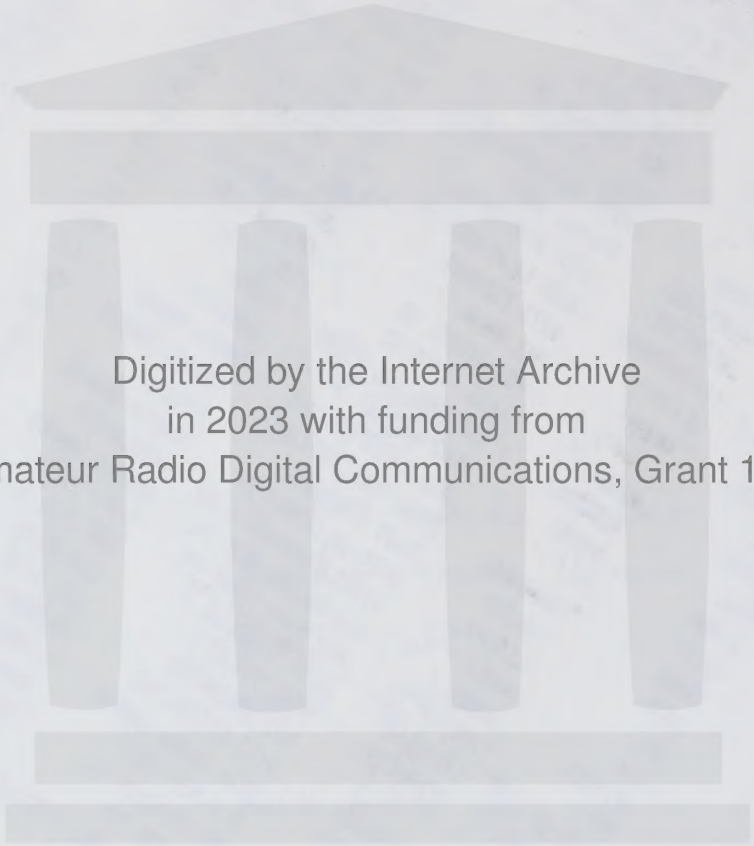
not connected through

phone line

10/11/92

KK6DJ

CALL	LAST NAME	FIRST NAME	SPOUSE	STREET	TOWN	STATE	ZIP	TELEPHONE
N6ACR	GAY	TOM	(POLLY)	2747 CROCKETT CIRCLE	LOS OSOS	CA	93402	528-1280
WB6AGE	COSENTINO	BOB		2001 WILLOW DR	LOS OSOS	CA	93402	528-0418
KA6ALP	MARTIN	PHOEBE	(FRANK)	PO BOX 955	ATASCADERO	CA	93422	466-0912
K6AME	GUNTER	BUD	(GAYLE)	1179 ANTLER DR	ARROYO GRANDE	CA	93420	489-3512
KB6ASU	POPE	H L (DOC)		1328 TANGLEWOOD DR	SAN LUIS OBISPO	CA	93401	
WA6BJF	LYONS	BETTY	VAN	383 MERCURY DR	NIPOMO	CA	93444	929-3710
N6BRR	FRANKE	GERRY	(DONNA)	1467 DALE AVE	ARROYO GRANDE	CA	93420	481-2961
W6BRY	MATHEWS	DON	(VIRGINIA)	PO BOX 98	PASO ROBLES	CA	93447-0098	238-4443
N6BUY	AUTH	DALE	(GERRY)	PO BOX 38	MORRO BAY	CA	93442	772-4005
N6BVL	STEVENS	ROY	(THERESA)	PO BOX 35	SAN MIGUEL	CA	93451	238-6643
WB6BZT	JACKSON	PAUL	(NINA)	1709 CORRALITOS	SAN LUIS OBISPO	CA	93401	543-6438
W6CED	BOYTE	LYN	(OPAL)	244 18TH ST	PASO ROBLES	CA	93446	238-3397
WA6CRM	HILL	CHRIS		1643 LONGBRANCH AVE	GROVER CITY	CA	93433	481-1128
W6DBU	LAPHY	ED	NORMA	P O BOX 697	MORRO BAY	CA	93442	
WD6DDX	BAKER	CARROLL		1280 BAYVIEW HGHT DR	LOS OSOS	CA	93402	528-1673
KG6DG	NEWMAN	JOE		P O BOX 6	CAMBRIA	CA	93428	927-5650
WA6DHS	WARNER	ROY	(FRIEDA)	1820 13TH ST	LOS OSOS	CA	93402	528-0891
WB6DNH	BAZIUK	LOU	(VERA)	425 POLARIS DR	NIPOMO	CA	93444	929-5436
WB6DPG	GOLDBERG	MIKE		1441 16TH ST	LOS OSOS	CA	93402	528-8316
W6EBC	COREY	CHUCK	(IRMA)	4971 HACIENDA DR	SAN LUIS OBISPO	CA	93401	544-5298
W6ECY	STOVALL	DES	(BERNICE)	PO BOX 6371	LOS OSOS	CA	93402	528-2934
WD6EKH	RISLEY	JOHN	(DOROTHY)	2020 JOHNSON AV	SAN LUIS OBISPO	CA	93401	543-5453
W6ELK	WETZEL	BEN	(DOROTHEA)	2630 LA MIRADA LN	LOS OSOS	CA	93402	528-5299
K6ELO	GRIGGS	ROXIE	(JOHN)	1273 13TH ST	LOS OSOS	CA	93402	528-0873
KE6EN	RAMIL	LAWRENCE	(ANNA)	815 PEARL	ARROYO GRANDE	CA	93420	481-6318
WA6EQT	DAVIS	BILL		853 RICHIE RD	GROVER CITY	CA	93433	489-0255
N6EST	FINWICK	HARVEY	(VERNA)	1435 14TH ST	LOS OSOS	CA	93402	528-5755
N6FBJ	BROWN	BILL	(LURINE)	HACIENDA DEL PISMO	PISMO	CA	93449	773-1494
K6FI	LOONEY	BYRON	(MARG)	6540 BUCKLEY DR	CAMBRIA	CA	93428	927-8733
W6FLL	RIEP	DALE		902 S WESTERN AVE	SANTA MARIA	CA	93454	925-4695
WB6FMC	KLEIN	CHUCK	(BARBARA)	1566 HILLCREST DR	ARROYO GRANDE	CA	93420	489-3860
WB6FWO	WILLMS	WALT	(HELEN)	2605 E SUSSEX	FRESNO	CA	93726	209-222-0274
NK6G	RAFTERY	JAY	(LLONA)	2404 CALLENDER RD	ARROYO GRANDE	CA	93420	481-0392
KF6GC	SMITH	O W	NANCY	11705 ATASCADERO RD	ATASCADERO	CA	93422	
KB6GIM	MILLIGAN	SHIRLEY	WOODY	426 GOLDEN WEST PL	ARROYO GRANDE	CA	93420	489-2977
KW4H	PIPER	BILL	(LEE)	416 S PALISADE DR	SANTA MARIA	CA	93454	928-2878
N6HA	AMBORN	HARRIET	(PHILLIP)	1279 DESCANSO ST	SAN LUIS OBISPO	CA	93401	544-0517
WD6HAY	CREERY	CLARENCE	(FRANCIS)	1748 7TH ST	LOS OSOS	CA	93402	528-3324
W6HDO	BUTTSCHARDT	CLIFF		573 MANZANITA	LOS OSOS	CA	93402	772-2132
WB6HWH	SHIRK	CHUCK	(NADINE)	0112 EDISON PH3	AUBERRY	CA	93602	209-855-2375
KR6I	BROWN	LORIN	(EUNICE)	1336 PASEO LADERO	ARROYO GRANDE	CA	93420	489-8617
WM6I	HANES	STEVE		P O BOX 13137	SAN LUIS OBISPO	CA	93406	546-1138
WB6IIY	LYONS	VAN	(BETTY)	383 MERCURY DR	NIPOMO	CA	93444	929-3710
W6JCB	BAUTTS	JOHN	LORRAINE	P O BOX 735	CAYUCOS	CA	93430	995-1287
N6JHT	FOSTER	GEORGE	MATILDA	HACIENDA DEL PISMO60	PISMO	CA	93449	773-2591
W6JNV	LONG	WALT	(BETTY)	1690 FAIRVIEW	SAN LUIS OBISPO	CA	93401	544-4751
W6JTA	TAUXE	BOB	(EVELYN)	1166 15TH ST	LOS OSOS	CA	93402	528-0755
K6KAX	CONNOR	ROSS		PO BOX 446	MORRO BAY	CA	93442	772-5527
K6KBN	PRESTON	OTIS		766 MESA VIEW RD 118	ARROYO GRANDE	CA	93420	481-1213
K4KCH	BOYLE	JOHN	ROSEANN	8545 PORTOLA RD	ATASCADERO	CA	93422	
WA6KDH	JECKER	JERRY	(ELIZABETH)	1384 FAIRWAY DR	SAN LUIS OBISPO	CA	93401	543-8404
WB6KEG	CAUSTIN	E B (BUCK)	(HELEN)	657 GARFIELD PL	ARROYO GRANDE	CA	93420	481-2623
WB6KER	COMPTON	BILL		428 HOLTBY RD	BAKERSFIELD	CA	93304	
W6KHY	CRUMB	MYER	(LOIS)	1297 RICH CT	SAN LUIS OBISPO	CA	93401	543-2432



CALL	LAST NAME	FIRST NAME	SPOUSE	STREET	TOWN	STATE	ZIP	TELEPHONE
WB6KJB	BUCICH	RICH		496 KENTUCKY AV	SAN LUIS OBISPO	CA	93401	546-2149
WA6KQD	BRUNK	LARRY		108 CRESTON RD	PASO ROBLES	CA	93446	239-0750
N6KTB	SCHADE	DICK		1423 WEST HOWARD AVE	VISALIA	CA	93277	209-734-7817
W6KW	GRIGGS	JOHN	(ROXIE)	1273 13TH ST	LOS OSOS	CA	93402	528-0873
N6KXS	RASMUSSEN	AAGE	RUTH	503 PARK VIEW	GROVER CITY	CA	93433	489-5113
K6KZO	SWANK	RED	(BETTY)	2150 SOMBRERO	LOS OSOS	CA	93402	528-0316
N6LYF	RHEINGANS	WALT	SHARON	1857 10TH ST	LOS OSOS	CA	93402	528-5527
N6LYZ	CASSIDY	PAUL	BEATRICE	P O BOX 6366	LOS OSOS	CA	93402	528-2694
NJ6M	RAFTERY	LLONA	(JAY)	2404 CALLENDER RD	ARROYO GRANDE	CA	93420	481-0392
K6MFJ	RICE	WENDELL		1241 FARRELL AV #53	ARROYO GRANDE	CA	93420	489-9480
KD6ML	MURTAUGH	JIM	(ELSIE)	171 FEL MAR DR	SAN LUIS OBISPO	CA	93401	544-3626
N6MLJ	STEPHENS	MICHAEL(MIKE	JUDITH	8 PERLA LANE	SAN LUIS OBISPO	CA	93401	544-7324
N6MUJ	WILSON	CHUCK	JEAN	660 SANTA YSABEL AVE	LOS OSOS	CA	93402	528-0647
KB6ND	MILLIGAN	WOODY	SHIRLEY	426 GOLDEN WEST PL	ARROYO GRANDE	CA	93420	489-2977
WB6NSO	PETERSON	WAYNE		695 EVANS RD	SAN LUIS OBISPO	CA	93401	543-3068
WB6OCW	HART	ORVRAL C		3127 W GETTYSBURY AV	FRESNO	CA	93711	209-224-5271
WA6OWQ	BOYE	CONRAD J		2232 EL DORADO	LOS OSOS	CA	93402	528-2447
W6PA	AMBORN	PHILLIP	(HARRIET)	1279 DESCANSO ST	SAN LUIS OBISPO	CA	93401	544-0517
WA6PNE	HANSEN	KEN	(KATHRYN)	240 BALI	MORRO BAY	CA	93442	772-3057
WB6PTW	JACKSON	CLARK		STAR ROUTE	MIRAMONTE	CA	93641	
WB6PYD	LEE	TONY	(PEGGY)	PO BOX 816	MORRO BAY	CA	93442	772-8428
WB6QFF	SAYERS	ED	(KI)	290 TERRA ST	MORRO BAY	CA	93442	772-4684
KF6QN	MUICK	NICK	PAT	278 MARLENE DR	SAN LUIS OBISPO	CA	93401	
KA6QQF	RIEKKI	DARYL		3960 S HIGUERA # 36	SAN LUIS OBISPO	CA	93401	
WA6QVC	SWANSON	GEORGE	(JULIA)	1149 SANTA CRUZ	SAN PEDRO	CA	90731	
WA6QVC	SWANSON	GEORGE	(JULIA)	TERESA CANYON-W TEMP	W OF TEMPLETON	CA	93465	238-3927
WB6RHR	ROBINSON	VERN	(LEE)	P. O. BOX 257	SHANDON	CA	93461	
KE6RL	MARTIN	FRANK	(PHOEBE)	PO BOX 955	ATASCADERO	CA	93422	466-0912
K6RXP	WILLIAMS	LEE	(LAVINA)	HACIENDA DEL PISM024	PISMO BEACH	CA	93449	773-2408
K6SAR	GLEMBOTSKI	ED	(JUDITH)	2551 LAWTON	SAN LUIS OBISPO	CA	93401	543-7375
KB6SC	CRAWFORD	SARGE	(FRIEDA)	PO BOX 6217	LOS OSOS	CA	93402	528-1542
WB6SYB	BUDDELL	BOB		P O BOX 133	SAN SIMEON	CA	93452	
K6TOE	JONASSON	ROY	(MILDRED)	PO BOX 1475	SANTA MARIA	CA	93456	928-6178
WB6TXP	REASOR	CHUCK	(JAN)	541 LA JOLLA	MORRO BAY	CA	93442	772-4952
WB6TXT	CHANDLER	BRYANT	(MARGARET)	829 SANTA MARIA	LOS OSOS	CA	93402	528-0250
W6TXT	MOORE	LARRY	(MARY KAY)	3152 SPRING COURT	SAN LUIS OBISPO	CA	93401	544-1351
W6TZW	HAENKE	HANK	(LUCY)	313 VISTA DEL MAR	PISMO BEACH	CA	93449	773-4231
WA6UCA	SORENSEN	JOHN		3424 VIA DONNA	LOMPOC	CA	93436	733-2294
KA6VSP	SMITH	NANCY	O W	11705 ATASCADERO RD	ATASCADERO	CA	93422	
WM6W	OWENS	HAL	(DOROTHY)	852 MESA DR	ARROYO GRANDE	CA	93420	489-5000
NM6W	PHELAN	DAN	(RUTH)	2159 LOS BERROS RD	ARROYO GRANDE	CA	93420	489-7549
W6WJ	PRYGA	STAN	(IRENE)	412 MAGNOLIA CIRCLE	HEMET	CA	92343	
W9WYJ	BELANGER	FLORENCE		1963 DONNA AV	LOS OSOS	CA	93402	528-5634
KG6XQ	GALLI	E M		1031 FARROLL AVE	ARROYO GRANDE	CA	93420	481-0175
WA6YMU	CARNEY	JIM		336 HIGHLAND DR	LOS OSOS	CA	93402	528-7271
K6YZR	ANDERSON	DAVE	(EDIE)	4735 HIDALGO AV	ATASCADERO	CA	93422	466-0323
WD6Z	SICHER	MAX	HELEN	1660 NIPOMO AVE	LOS OSOS	CA	93402	528-5065
WA6ZBE	ROBINSON	LEE	(VERN)	PO BOX 257	SHANDON	CA	93461	
W6ZEK	AGEE	RALPH		430 LA JOLLA	MORRO BAY	CA	93442	772-2332
W6ZRR	JOHNSON	ERNIE	(ETHEL)	265 ALMOND ST	SAN LUIS OBISPO	CA	93401	543-7641
W6ZZC	ROUSE	EARL	(MARCIA)	3821 CAPPOLA	VISALIA	CA	93277	

CENTRAL COAST AMATEUR RELAY SOCIETY

PO BOX 361, SAN LUIS OBISPO, CA 93406

. . . . . .

NET CONTROL PROCEDURE:

"GOOD EVENING. THIS IS ------, NET CONTROL FOR THE CENTRAL COAST AMATEUR RELAY SOCIETY NET. MY HANDLE IS ------ , AND MY QTH is ------. THIS REPEATER, WB6FMC/R, IS OWNED AND MAINTAINED BY THE MEMBERS OF THE SOCIETY AND WB6FMC IS OUR TRUSTEE."

"THIS REPEATER IS AT AN ELEVATION OF 2475 FEET ON CUESTA PEAK 6 MILES NORTH OF SAN LUIS OBISPO. OUR 450 SYSTEM OPERATES ON 447.7 IN AND 442.7 OUT AND IS INTERCONNECTED WITH OUR 6 METER SYSTEM ON 52.525 OR 52.490. OUR SYSTEMS ARE OPEN AND AVAILABLE TO ALL RADIO AMATEURS. THIS NET MEETS EVERY TUESDAY NIGHT ON THE AIR AT 8:00 PM. IN ADDITION WE HOLD A MEETING THE SECOND TUESDAY OF THE MONTH AT THE PGE BUILDING, 410 HIGUERA IN SAN LUIS OBISPO AT 8:00 PM."

"A ROLL CALL OF THE MEMBERS WILL FOLLOW. WE WILL THEN LISTEN FOR GUEST AND VISITOR CHECK_INS. THE NET WILL THEN CALL STATIONS WITH TRAFFIC IN ORDER OF LISTING. THIS IS ------ STANDING BY FOR ANY EMERGENCY OR PRIORITY TRAFFIC. IS THERE ANY FORMAL WRITTEN TRAFFIC TO BE LISTED AT THIS TIME?"

1. Call the roll.
2. Call for late or missed members.
3. Call for guest or visitor stations.
4. Call stations with listed traffic.
5. Call for any further check-ins or information.
6. Turn the net over to Sarge, KB6SC, for the swap session.
7. Close the net as follows:

"THIS HAS BEEN ------ NET CONTROL FOR THIS EVENINGS CENTRAL COAST AMATEUR RELAY SOCIETY NET. MY HANDLE IS ------, AND MY QTH IS ------. WE THANK YOU ALL FOR JOINING US, AND FOR ANYONE WISHING FURTHER INFORMATION, CONTACT ANY NET CONTROL STATION. 73 AND GOOD EVENING."

CENTRAL CALIFORNIA COAST CHAPTER
QUARTER CENTURY WIRELESS ASSOCIATION, INC.
MEMBERSHIP ROSTER - JANUARY 1977

Agee, Ralph	W6ZEK	12128 Hesby, N. Hollywood, CA 91607
Amborn, Harriet L.	K6IT	P.O. Box 903, Atascadero, CA 93422
Amborn, Philip W.	W6PA	P.O. Box 903, Atascadero, CA 93422
Ayers, Bert	W6CL	2132 W. 146th Pl., Gardena, CA 91311
Bethard, Charles T.	W6MTK	1238 Sixth St, Los Osos, CA 93401
Bickel, John E.	W6NY	7455 Cortina, Atascadero, CA 93422
Brewer, Mort S.	W6JU	633 Ramona Ave, Sp #55, Los Osos, CA 93402
Burdette, Earl	W6YYV	12816 Flora Vista, Poway, CA 92064
Cameron, Donald G.	W6UJ	516 South F St., Lompoc, CA 93436
Cassou, Leonard J.	W6EKO	1401 East Airport St., Lompoc, CA 93436
Challinor, Ralph	W6QJE	4706 E. Washington, Fresno, CA 93702
Chavez, Manuel E.	W6QMV	806 West Barrett St., Santa Maria, CA 93454
Corey, Charles T.	W6EBC	4971 Hacienda Drive, San Luis Obispo, CA 93401
Crumb, Myer L.	WB6ECM	1297 Rich Ct., San Luis Obispo, CA 93401
Decker, Gerard Q.	K6EPY	875 Park Lane, Santa Barbara, CA 93103
Eells, Beatrice M.	W6JXU	209 Jeffrey, San Luis Obispo, CA 93401
Eells, Floyd M.	W6FNP	209 Jeffrey, San Luis Obispo, CA 93401
Fickas, Merwin J.	W6AGN	881 Delano St., Pismo Beach, Ca 93449
Finchum, W. Arnold	W6HO	4900 Nogales St., Atascadero, Ca 93422
Furlong, Ray A. N6RF/	W6QIL	2949 E Eckleson St., Lakewood, Ca 90712
Gartzke, Fred J.	K6YD	2526 Calle Galicia, Santa Barbara, Ca 93109
Gerue, Donald R.	K6YX	3667 Montalvo Way, Santa Barbara, Ca 93105
Griggs, John R.	W6KW	1273 - 13th St., Los Osos, Ca 93402
Gutheil, Byron	K6TX	2092 Willow Dr., Los Osos, CA 93402
Hege, Irvin O.	W6FYW	P.O. Box 352, Paso Robles, CA 93446
Holly, Robert	W6DRV	5352 Amigo Ave., Tarzana, Ca 90249
Horton, Robert	W6MSG	2 Fresno Street, Paso Robles CA 93446
Janeway, Robert K.	W6HVT	33 Verde Drive, San Luis Obispo, Ca 93401
Johnson, Ernest J.	W6ZRR	265 Almond Drive, San Luis Obispo, Ca 93401
Long, Walter H.	W6JNV	1690 Fairview Ave., San Luis Obispo, Ca 93401
Lowe, Raymond A.	K6CDJ	445 Kings Ave., Morro Bay, Ca 93442
Luitwieler, S. Henry	K6OW	380 Fairview Ave., Morro Bay, Ca 93442
Magnuson, Elmer E.	W6IXM	401 East Fir Ave., Lompoc, Ca 93436
McLaughlin, Clair	W6EGC	P.O. Box 888, Paso Robles, CA 93446
Moser, Dr. Chas	W6HS	2153 Lyans Drive, La Canada, Ca 91011
Newsome, Jim	W6BTO	S. River Road, Paso Robles, CA 93446
Peffly, Mary	W6TCN	632 Bolen Drive, Paso Robles, CA 93446
Peirce, Wendell W.	W6FSJ	1246 - 9th Street, Los Osos, CA 93402
Rogers, Alden H.	K6DI	P.O. Box 544, Summerland, CA 93067
Rouse, Earl D.	W6ZZC	2120 S. Santa Fe, Visalia, CA 93277
Smith, Milt C.	W6GMC	328 Harsin Lane, Santa Maria, CA 93454
Stovall, Desmond H.	W6ECY	P.O. Box 6371, Los Osos, CA 93401
Tauxe, Robert W.	W6JTA	1166 - 15th St., Los Osos, CA 93402
Tiffin, John	W6TYR	2461 Johnson Ave., San Luis Obispo, CA 93401
Van Vorst, Earl	W6MSW	P.O. Box 233, Paso Robles, CA 93446
Weir, Charles E. Sr.	W6UA	Rt 3 Box 260-B, San Luis Obispo, CA 93401
Weller, Harry H.	W6IP	1405 W. Walnut Ave., Lompoc, CA 93436
Wollam, Harold M.	W6LB	P.O. Box 1275, Santa Maria, CA 93454

Officers for 1977:

Chairman	Mort Brewer W6JU
Vice Chairman	Bob Tauxe W6JTA
Secty/Treas	Harriet Amborn K6IT
Historian	Des Stovall W6ECY

Add:

Blake, Clayt	W6AGK	2143 Santa Anita Ave., Altadena, CA 91001
Joffe, Moe	W6PHE	7259 Willoughby Ave, #12; Los Angeles, CA 90046

CENTRAL CALIFORNIA COAST CHAPTER
QUARTER CENTURY WIRELESS ASSOCIATION, INC.
MEMBERSHIP ROSTER - JANUARY 1977

W6AGN	Merv Fickas
K6BPY	Gerry Decker
W6BTO	Jim Newsome
K6CDJ	Ray Lowe
W6CL	Bert Ayers
K6DI	Alden Rogers
W6DRV	Bob Holly
W6EBC	Chuck Corey
WB6ECM	Myer Crumb
W6ECY	Des Stovall
W6EGC	Clair McLaughlin
W6EKO	Len Cassou
W6FNP	Floyd Eells
W6FSJ	Wendell Peirce
W6FYW	Irv Hege
W6GMC	Milt Smith
W6HS	Mert Moser
W6HVT	Bob Janeway
W6IP	Harry Weller
K6IT	Harriet Amborn
W6IXM	Elmer Magnuson
W6JNV	Walt Long
W6JTA	Bob Tauxe
W6JU	Mort Brewer
W6JXU	Bea Eells
W6KW	John Griggs
W6LB	Hal Wollam
*W6HO	Arnold Finchum Ex W9MO
W6MSG	Bob Horton
W6MSW	Van Van Vorst
W6MTK	Charles Bethard
W6NY	John Bickel
K6OW	Henry Luitwieler
W6PA	Phil Amborn
W6QIL	Ray Furlong also N6RF
W6QMV	Manny Chavez
W6QQE	Ralph Challinor
W6TCN	Mary Peffly
K6TX	Byron Gutheil
W6TYR	John Tiffin
W6UA	Charles Weir
W6UJ	Don Cameron
K6YD	Fred Gartzke
K6YX	Don Gerue
W6YYV	Earl Burdette
W6ZBK	Ralph Agee
W6ZRR	Ernie Johnson
W6ZZC	Zig Zag Charlie Rouse

Our NET meets at 10:00 AM local time every SATURDAY on 3917 Khz (plus or minus). Net control (usually) is W6JU. Please check in when possible.

Two additional members to be added to list were received on March 3 just before list was copied. We have our magic FIFTY.

W6PHE	Moe Joffe
W6AGK	Clayt Blake

*Note: Arnold Finchum, W9MO is now W6HO

BUILDING A HIGH QUALITY LINEAR AMPLIFIER?

Pittinger 4-KW Silver Plated Pi-Network Coil Set

This 4-KW coil set has been designed to provide a first-class tank coil at a reasonable price. The coils are suited to amplifier designs using popular vacuum tubes such as the 3CX1500A7(8877), 3CX1000A, 3-500Z, 3-1000Z, 4-1000A, 4CX1000, etc. All coils are constructed from the highest quality materials to provide many years of reliable service. The following table sumarizes the characteristics of the coils:

BAND	TUBING	COIL DIA	LENGTH	NO. TURNS	APPROX uH.
10	1/4 in	1-3/4 in	2-1/8 in	6	1.0 uH
15/20	1/4	3-1/4	3	5	1.8
40/80	3/16	3-3/16	5	16	10.0

All coils are silver plated to maximize efficiency. Also supplied are five 3/8 in. by 8 in. silver plated straps that can be used to tap the coils to obtain the desired inductance on each band (80-10) for the calculated plate load. (See ARRL or Orr handbooks for Pi-network design parameters).

The coils are designed to be connected in series in any physical arrangement the builder may desire. Saw the coil end leads to proper length, flatten the tubing, and mount for your own layout.

If you are not satisfied with the coil set, you may return it within 15 days for a full refund.

Pittinger coils are priced for tha amateur builder.....$28.00

G R WHITEHOUSE & CO
Newbury Drive, Amherst, New Hampshire 03031

ULTIMATE SPECIAL

Save $32.70 Both capacitors for the McCoy Ultimate Transmatch (ARRL Handbooks).

Regular 154-507	$ 59.30
154-10	44.40
	$103.70
Combination Price	$ 71.00
SAVINGS!!!!!!!!!	32.70

HAM RADIO MAGAZINE AND HAM RADIO HORIZONS
PROJECTS

Audio Oscillator, Ham Radio Horizons, March 1977
PC Board Only $3.00 ppd.
PC board, 8038CC,0.15,0.015,0.0015 and 1.5 caps $9.50 ppd.

Linearity Meter, Ham Radio Magazine, June 1976
PC Board only $2.50 ppd.
Complete kit $19.95 ppd.

Shirt Pocket Transistor Tester, Ham Radio Magazine, July 1976
Complete kit less battery $29.95 ppd.

Simple Electronic Keyer, Ham Radio Horizons, May 1977
PC Board Only $3.50 ppd.
(Note: Layout in magazine is oversized).

Wavemeter, Ham Radio Horizons, May 1977.
PC Board only $4.00 ppd.
PC Board, Variable capacitor,5-pin socket, 6 coil forms $18.15 ppd.

RX Noise Bridge, Ham Radio Magazine, February, 1977
PC Board only $4.00 ppd.
PC Board plus all components in Fig 9 except variable capacitor and battery $15.00 ppd. (Note: Capacitor comes from Radio Shack)

ANTENNA SEASON IS HERE:

3 inch open wire spreaders 50¢ each

G R Whitehouse & Co.

HOMEBREW HEADQUARTERS

G. R. WHITEHOUSE & CO.
Newbury Dr.
Amherst, N. H. 03031

DATE ____________

I am building: ____________

SHIP TO: ______________________________

____

ZIP ______

(Include Street Address for UPS)

QTY	PART NUMBER	DESCRIPTION	EACH	TOTAL

/__/CHECK OR MONEY ORDER	TOTAL FOR GOODS	
/__/BANKAMERICARD	SHIPPING & HANDLING	2.00
/_/ MASTER CHARGE	TOTAL AMOUNT DUE	

CHARGE CARD NO.______________________ NO COD PLEASE

EXP. DATE____________

(M.C. Only) Inter Bank #______________

-PLEASE DO NOT SEND CASH-

G R WHITEHOUSE & CO
NEWBURY DR.
AMHERST, NH 03031

BARKER & WILLIAMSON

AIR WOUND COILS/MINIDUCTORS

Part Number	Coil Diameter	Turns per Inch	Length	Wire Size	Inductance
3001	1/2"	4	2"	18	0.18
3002	1/2"	8	2"	18	0.72
3003	1/2"	16	2"	20	3.00
3004	1/2"	32	2"	24	12.0
3005	5/8"	4	2"	16	2.75
3006	5/8"	8	2"	18	1.10
3007	5/8"	16	2"	20	4.50
3008	5/8"	32	2"	24	18.0
3009	3/4"	4	3"	16	1.20
3010	3/4"	8	3"	18	2.50
3011	3/4"	16	3"	20	10.0
3012	3/4"	32	3"	24	40.0
3013	1"	4	3"	16	1.00
3014	1"	8	3"	18	4.10
3015	1"	16	3"	20	17.0
3016	1"	32	3"	24	68.0
3017	1 1/4"	4	4"	14	2.20
3018	1-1/4"	8	4"	16	9.00
3019	1-1/4"	16	4"	18	36.0
3020	1 1/4"	32	4"	24	145.0
3021	1-3/4"	4	4"	14	4.20
3022	1-3/4"	8	4"	14	16.5
3023	1-3/4"	16	4"	18	67.0
3024	1 3/4"	32	4"	24	270.0
3025	2"	6	10"	12	33.0
3026/3900	2"	8	10"	14	59.0
3027/3907 1	2"	10	10"	16	92.0
3029/3905 1	2-1/2"	6	10	12	51.0
3030/3906 1	2-1/2"	8	10"	14	90.0
3031	2 1/2"	10	10"	16	140.0
3033	3"	6	10"	12	71.0
3034	3"	8	10"	14	125.0
3035	3"	10	10"	16	198.0
3036	1/2"	6	2"	18	0.40
3037	1/2"	10	2"	18	1.10
3038	1/2"	24	2"	22	6.75
3039	5/8"	6	2"	18	620
3040	5/8"	10	2"	18	1.70
3041	5/8"	24	2"	22	10.0
3042	3/4"	6	3"	18	1.40
3043	3/4"	10	3"	18	3.90
3044	3/4"	24	3"	22	23.0
3045	1"	6	3"	18	2.40
3046	1"	10	3"	18	6.60
3047	1"	24	3"	22	38.0
3048	1 1/4"	6	4"	14	5.00
3049	1 1/4"	10	4"	18	14.0
3050	1-1/4"	24	4"	22	81.0
3051	1 1/2"	4	4"	14	3.10
3052	1 1/2"	6	4"	14	7.00
3053	1 1/2"	8	4"	16	12.5
3054	1 1/2"	10	4"	18	20.0
3055	1-1/2"	16	4"	20	50.5
3056	1-1/2"	24	4"	22	110.0
3057	1 1/2"	32	10"	24	200.0
3058	1 3/4"	6	4"	14	9.40
3059	1 3/4"	10	4"	16	26.0
3060	1-3/4"	24	4"	22	150.0
3061	2"	4	10"	12	15.0
3062	2"	16	10"	16	238.0
3063	2 1/2"	4	10"	12	22.5
3064	3"	4	10"	12	32.0

BARKER & WILLIAMSON

FILAMENT & PLATE CHOKES

MODELS FC-15A AND FC-30A
GROUNDED GRID AMPLIFIER FILAMENT CHOKES
INSTRUCTIONS

The Model FC-15A Filament Choke is a dual winding choke with a current carrying capacity of 15 amperes. The Model FC-30A Filament Choke is a twin dual winding choke with a current carrying capacity of 30 amperes. In both chokes this current refers to the filament current of a tube or group of tubes. With the Model FC-30A the four winding feature makes it possible to use separate filament transformers for each of the two tubes and individual metering in the cathode circuit. In both models the "In" and "Out" terminals of each winding are at opposite ends of the case and in line with each other. Either end may be used for source or load.

R.F. Characteristics of both FC-15A and FC-30A

Frequency Range: 3.5 to 30 Megahertz
R.F. Voltage: 150 Volts RMS. Maximum

In grounded grid circuits, the impedance looking into the cathode is low; therefore, the RF drive should be taken from a low impedance source (52 or 75 ohms) using coaxial cable, *not more than 5 ft. long.* No tuning is necessary.

Dimensions: 2" x 2-1/2" x 5"

Model FC-15A $22.00
Model FC-30A 27.50

Model FC-25A Choke is an economy line Filament Choke. Bifilar wound with #10 wire on ½" round Ferrite, 8 inches long. Mounting brackets included.

R.F. Characteristics

Frequency Range: 3.5 to 30 Megahertz
R.F. Voltage: 150 Volts RMS. Maximum

Model FC-25A $13.25

RF PLATE CHOKE

This unit is ideal for parallel or series fed high power final amplifier circuits. It is used for operation in the amateur bands – 80 through 10 meters inclusive. Winding is on a high quality grooved steatite form, threaded on both ends, for mounting with a ¼"–#20 screw. Rating is 90 [illegible] 2500 VDC at 500 Ma. Size 6" x ½" in diameter. Shipping weight 1 lb.

Model 800 $8.25

Protect your valuable equipment from lightning damage. Use B & W PROTAX Switches

PROTAX™ ANTENNA SWITCHES WITH AUTOMATIC GROUNDING

B & W "Protax" Coaxial Switches function as regular selector switches with the additional feature of automatically grounding the entire [illegible] standards that escalated our entire coaxial switch line to its present foremost position in the field.

SPECIFICATIONS

Internal Construction	Ceramic switch with silver plated conductors
Power Carrying Capacity	1000 watts
Insertion Loss	Negligible
VSWR	Less than 1.2 up to 150 MHz
Mounting	Behind panel
Hardware	Escutcheon plate with provision for erasable markings, mounting screws and knob (Mounting brackets with radial switches)

Model 375 $18.95
6 position rear mounted (axial) connectors
Model 376 $18.95
5 position side mounted (radial) connectors

MINIDUCTOR PRICES

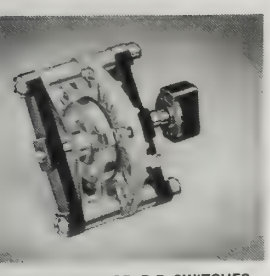
3001	$1.60	3011	$1.90	3021	$2.20	3033	$6.10	3042	$1.70	3052	$2.05	3062	$4.65
3002	1.70	3012	2.05	3022	2.35	3034	6.15	3043	1.85	3053	2.15	3063	5.00
3003	1.85	3013	1.70	3023	2.45	3035	6.20	3044	1.95	3054	2.20	3064	6.05
3004	1.95	3014	1.85	3024	2.60	3036	1.65	3045	1.80	3055	2.30		
3005	1.60	3015	1.95	3025	4.45	3037	1.80	3046	1.90	3056	2.35		
3006	1.70	3016	2.10	3026	4.50	3038	1.90	3047	2.05	3057	2.40		
3007	1.85	3017	1.90	3027	4.55	3039	1.65	3048	1.95	3058	2.30		
3008	1.95	3018	2.05	3029	5.05	3040	1.80	3049	2.10	3059	2.40		
3009	1.65	3019	2.15	3030	5.10	3041	1.90	3050	2.20	3060	2.50		
3010	1.80	3020	2.40	3031	5.15	3042	1.70	3051	1.95	3061	4.40		

Look it over, Walter.

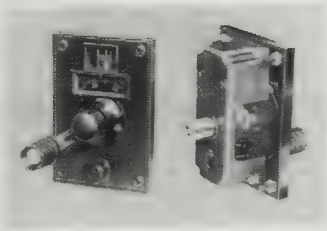
G.R. WHITEHOUSE & CO.

Newbury Drive, Amherst, N. H. 03031

JAMES MILLEN MFG. CO., INC.



D HIGH VOLTAGE R-F SWITCHES
— Single Wafer — 1 pole, 2 to 6 positions
13 Kv. D.C. Flashover
20 Amperes $21.20

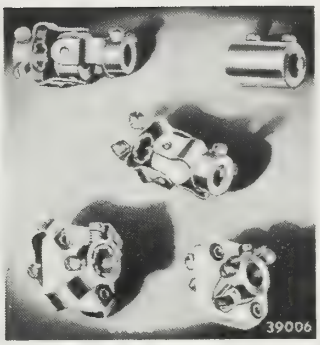


10031 COUNTER DIAL $28.10

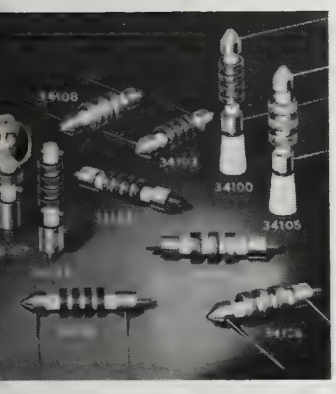
The No. 10031 Dial is a rugged turns counter dial. It has a 0-99 turn digital readout plus a vernier scale calibrated 0-100. The design includes a built-in dial lock. As shown below, the output coupling is a hub for ¼" diameter shaft. The crank handle drives any multiturn device directly. This new small size dial is designed to drive vacuum variable capacitors, rotary tunable inductors, multi-turn potentiometers, permeability tuned inductors and other multi-turn devices.

Multi-Scale Dial
10039 $15.70

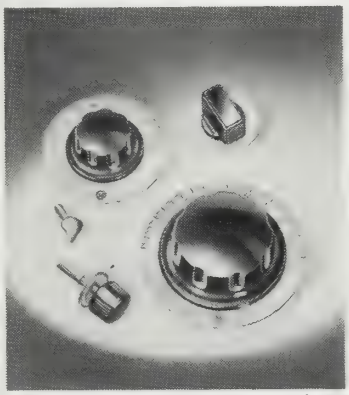
No. 10039 Small panel dial only 4" x 3 9/32". 7½:1 ratio Scale is printed on vinylite and is easily removable for inking without disassembling the dial. The 10039 dial mounts easily on the front of panel with two #6-32 screws. Scale reads left to right. The knob is a standard Millen No. 10018 knob Finish of bezel is black Ebonol. The bezel has blanks for mounting two extra controls which may be brought out through the dial face. The holes are to be drilled by the customer. The pointer is a deep non-paralax type



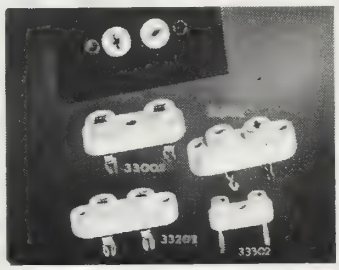
Millen	Mat'l	Length	Voltage	Price
39001	Ceramic	1-5/16"	4000	$1.55
39002	Ceramic	13/16	3000	1.55
39003	Brass	3/4	None	1.00
39004	Brass	3/4	None	1.55
39005	Brass	1-5/16	None	1.55
39016	Cycolac	9/16	4400	1.55



Millen	Ind	Curr	Price
34100	2.5 mH	250ma	$1.50
34101	2.5	250	1.40
34102	2.5	250	1.40
34103	2.5	250	1.40
34104	2.5	250	1.60
34105	1.0	300	1.55
34107	1.0	300	1.40
34108	1.0	300	1.40
34154	1.0	600	4.30
34156			5.85



Millen	Description	Price
1005B	1-5/8" 180 deg. CW	$1.60
10007B	1-5/8" 280 deg CW	1.75
10008	3½" 180 deg CW	4.75
10009	2-3/4" 180 deg CW	2.95

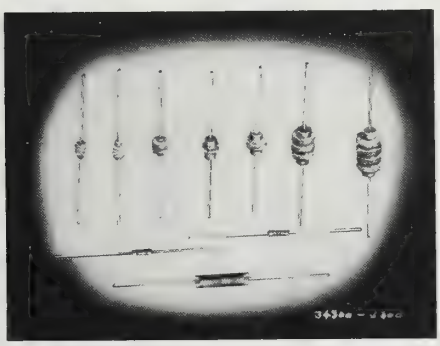


CRYSTAL SOCKETS

Millen	Size	Price
33002	.75"x.125"	$0.80
33102	.487x.095	.85
33202	.50 x.125	.85
33302	.487x.050	.65

MILLEN ITEMS

J300-10	$1.30	31001	$0.60
J300-25	1.30	31011	0.45
J300-33	1.30	32101	1.00
J300-68	1.30	33004	1.55
J300-500	1.50	36001	0.80
J300-1000	1.50	36002	0.80
J300-2500	1.80	37001-blk	1.80
J301-22	1.55	37001-red	1.80
J302-10	3.30	37304	3.35
J302-500	3.30	37305	3.75
J302-1000	3.30	37501	1.80
J302-10,000	4.20	40305	1.55
J303-10	5.05	41305	1.90
10035	23.75	45004	1.20
10050	1.75	69046	2.15
10066	0.85	69048	3.85

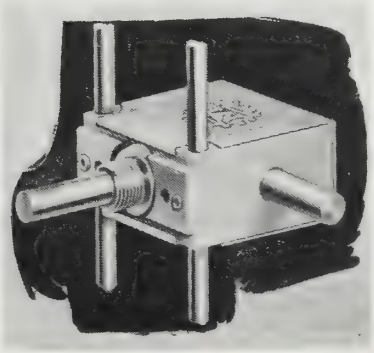


34300 SERIES INDUCTORS
Net Price.....$1.20

Millen	Inductance(uH)
34300-2.5	2.5uH
34300-2.7	2.7
34300-10	10.
34300-25	25
34300-50	50
34300-68	68
34300-100	100
34300-500	500
34300-1000	1000
34300-2500	2500

MAY WE HELP

These pages illustrate only a small portion of the parts that we can supply. Should you need any parts from these or ANY OTHER manufacturers please contact us. We would like to be of assistance. Small parts orders are our only business.



10012 RIGHT ANGLE DRIVE - Extremely compact, with provisions for many methods of mounting. Ideal for operating capacitors, switches, etc., that must be located for short leads, in remote parts of chasis. for ¼ in. shaft.....$21.25.

VARIABLE CAPACITORS

TYPE160

These miniature air variable capacitors are excellent for use in compact equipment. Mounting bushings threaded ¼-32 with flats to prevent turning. Peak voltage 1250 volts (.017") on all units except 160-130 which is rated at 850 volts peak. All units have ½" long shafts and range in depth from 3/4" t[illegible] 1¼".

Single Section

Cardwell	Hammarlund	Max pf.	Min pf.	Plates	Net Price
160-102	MAC-5	5	1.5	5	$[illegible]
160-104	MAC-10	8	1.8	9	[illegible]
160-107	MAC-15	14	2.3	15	[illegible]
160-110	MAC-20	19	2.7	21	4.[illegible]
160-130	MAC-30	32	3[illegible]	[illegible]	[illegible]

Butterfly

Cardwell	Hammarlund	Max pf.	Min pf.	Plates	Net Price
160-203	MACBF-3	3	1.5	5	
160-205	MACBF-5	5	1.8	10	$[illegible]
160-208	MACBF-8	8	2.2	1[illegible]	[illegible]
160-211	MACBF-11	10	2.7	2[illegible]	[illegible]

Differential

Cardwell	Hammarlund	Max pf.	Min pf.	Plates	Net Price
160-303	MAC-5-5	5	1.5	5	
160-305	MAC-10-10	8	1.8	9	$[illegible]
160-308	MAC-15-15	14	2.3	15	[illegible]
160-311	MAC-20-20	19	2.7	21	5.[illegible]

These widely used capacitors have a peak voltage rating of 1000 volts (0.015" air gap). They range in size from 1" to 2" behind the panel.

APCs

Cardwell	Hammarlund	Max pf.	Min pf.	Plates	Net Price
158-12	APC-15B	15	2.7		$[illegible]
158-2	APC-25B	25	3.0	7	[illegible]
158-3	APC-50B	50	3.4	14	[illegible]
158-4	APC-75B	75	4.6	20	5.9[illegible]
158-5	APC-100B	100	4.[illegible]	27	[illegible]
158-6	APC-140B	140	5.6	37	[illegible]

TRIMMERS

Variable compression
Mica Trimmers

ARCO Type 40 is 3[illegible]" x 9/1[illegible]
ARCO Type 42 is 3/8 x 3/4
ARCO Type 46 is 5/8 x 3/4

ARCO No.	Max pf.	Min pf.	Net Price
400	7	0.9	$1.00
402	20	1.5	1.00
403	40	4	1.25
404	60	4	1.45
405	80	10	1.80
406	115	15	1.90
420	12	1	1.10
421	25	2	1.00
422	40	4	1.00
423	100	7	1.10
424	150	16	1.40
425	200	24	1.60
426	250	37	1.80

ARCO No.	Max pf.	Min pf.	Net Price
427	300	55	$2.0[illegible]
428	350	70	2.00
429	400	90	2.0[illegible]
460	15	1.5	1[illegible]
461	40	2.7	1.0[illegible]
462	80	5	1.00
463	180	10	1.1[illegible]
464	280	25	1.30
465	380	50	1.30
466	480	75	1.45
467	580	105	1.45
468	680	135	1.70
469	780	170	2.10

Small Johnson air variables
Johnson series 187 or 189.....$1.50ea.
Johnson series 193...........$3.00ea
Please specify entire part number or values desired and type of mount. [illegible]pular values in stock; we will [illegible]rder others for you.

ERIE Trimmers
Series 538-000, 538-006, and 538-002 all values $2.50ea.
Series 538-011 all types $[illegible] ea

TYPE 148

These capacitors are midway in size between '160' and '158' capacitors. They have peak voltage ratings of 850 volts (.013"). They feature single hole mounting and range in depth from 1" to 3"

Single Section

Cardwell	Hammarlund	Max pf.	Min pf.	Plates	Net Price
148-1	MAPC-15B	15	2.3	6	$4.7[illegible]
148-2	MAPC-25B	25	2.6	10	4.65
148-3	MAPC-35B	35	2.9	14	4.75
148-4	MAPC-50B	50	3.2	19	4.90
148-5	MAPC-75B	75	3.9	29	5.0[illegible]
148-6	MAPC-100B	100	4.5	38	5.10

TYPE149 &167

[illegible]

Butterfly

[illegible]	[illegible]	[illegible]	$8.35
[illegible]	[illegible]	1.7	[illegible].75

Dual Section

[illegible]	[illegible]	[illegible]	$13.30
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]

[illegible] with different spacings [illegible] whereas HRD is [illegible] capacitor.

[illegible]	Max pf.	Min pf.	Net Price
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	5	16.90
[illegible]I	[illegible]	4	30.20

[illegible] MC and M[illegible] capacitors are available [illegible] [illegible]line capacitance [illegible]racteristi[illegible]. [illegible] are designated S [illegible] M [illegible] characteristic [illegible]. The nominal [illegible] for those [illegible] I [illegible]nd suffix. The I types have a [illegible] gap of .0715 [illegible] varities are in stock the [illegible].

[illegible]	[illegible]	Max pf.	Min pf.	Net Price
[illegible]	[illegible]	[illegible]	[illegible]	$[illegible]
M[illegible]S	149-[illegible]	[illegible]	[illegible]	[illegible]
M[illegible]M		[illegible]	[illegible]	[illegible]
M[illegible]S	149-[illegible]	[illegible]	[illegible]	[illegible]
M[illegible]M		[illegible]	[illegible]	[illegible]
MC75S	149-[illegible]	[illegible]	[illegible]	[illegible]
M[illegible]M		[illegible]	[illegible]	[illegible]
MC100S	149-[illegible]	[illegible]	[illegible]	[illegible]
MC1[illegible]M		[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
MC[illegible]M		[illegible]	[illegible]	[illegible]
MC[illegible]M		[illegible]	[illegible]	[illegible]
MC325M		[illegible]	[illegible]	[illegible]
M[illegible]I		[illegible]	[illegible]	[illegible]
M[illegible]I		[illegible]	[illegible]	[illegible]
M[illegible]I		[illegible]	[illegible]	[illegible]
M[illegible]I		[illegible]	[illegible]	[illegible]
M[illegible]I		[illegible]	[illegible]	[illegible]

Dual Section

MCD[illegible]M	[illegible]	[illegible]	$[illegible]
MCD[illegible]M	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]
[illegible]I	[illegible]	[illegible]	[illegible]

MILLEN

Millen 190[illegible] Series
[illegible]22" Air Gap 850 Volts Peak
Single Section Double End [illegible]

Millen	Max pf.	Min pf.	Plates	Net Price
19035	39	6.0	[illegible]	$[illegible]
19050	58	6.5	7	[illegible]
19075	80	7.5	10	9.30
19140	148	9.7	18	12.00
19335	339	14.7	47	14.90

Millen 26000 Series
015" Air Gap 600 Volts Peak
Dual Section

Millen 26100RM 100 pf/Sec $10.20
Millen 26140RM 140 pf/Sec 12.00

See Transmitting Variables for more Millen capacitors.

TRANSMITTING VARIABLES

[illegible]

[illegible]	[illegible]	Max pf.	Min pf.	[illegible]	Net Price
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	$[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Millen					
16520	6000	203	3[illegible]	.171	35.30
16520A	3000	200	3[illegible]	[illegible]	24.75

[illegible]

15[illegible]	[illegible]	[illegible]	[illegible]	.075	$59.30
1[illegible]	[illegible]	[illegible]	20	.077	43.25

Send for quote o[illegible] [illegible]ther large variables. Include des[illegible] of your needs.

TOROIDS & BEADS

POWDERED IRON TOROIDS

Size Mix	Price	Size Mix	Price	Size Mix	Price
T 200-2	$1.60	T 68-2	$.35	T 37-2	$.25
T 157-2	1.45	T 68-3	.35	T 37-6	.25
T 130-2	1.15	T 68-3	.35	T 37-10	.25
T 106-2	.75	T 68-6	.35	T 37-12	.25
T 106-3	.75	T 68-10	.35	T 25-2	.20
T 94-1	.50	T 50-2	.30	T 25-6	.20
T 94-2	.50	T 50-3	.30	T 25-10	.20
T 94-3	.50	T 50-6	.30	T 25-12	.20
T 94-6	.50	T 50-10	.30	T 12-2	.15
T 80-2	.40	T 50-12	.30	T 12-10	.15
T 80-3	.40	T 44-2	.30		

FERRITE TOROIDS

Size Mix	Price	Size Mix	Price
FT 37-63	$.30	FT 50-72	$.35
FT 50-43	.35	FT 82-61	.40
FT 50-61	.35	FT 82-72	.40
FT 50-63	.35		

FERRITE BEADS

Size Mix	Price/doz.	Size Mix	Price/doz.	Size Mix	Price
FB43-101	$1.00	FB64-101	$1.00	FB73-101	$1.00
FB43-801	1.50	FB64-801	1.50	FB73-801	1.50
FB43 -2401	1.75	FB64-901	1.75		
FB43-5111	1.65	FB64-5111	1.65		

64 Material is used above 200 MHZ.
43 Material is used between 50 and 200 MHZ.
73 Material is used below 50 MHZ.
Type 101 fits 18 awg wire,type 801 fits 12 awg wire,
Type 901 is 2 holes for 18 awg wire
Type 2401 is a large single hole
Type 5111 has six holes for approx 24 awg wire.

FERRITE RODS

30-61-4 ½" dia 4" $1.50
30-61-7 ½" dia 7½" 2.50

Some iron powdered toroid specs

Mix	Permeability	Freq(open coil)
1	20	200khz-5mhz
2	10	400khz-10mhz
3	35	50khz-1mhz
6	8.5	10mhz-70mhz
10	6	50mhz-100mhz
12	4	50mhz-200mhz

For detailed info see ARRL Electronic Data Book

J. W. MILLER

Partial price list write for quotations on items not listed.

1457	$2.97
1460-1	6.48
1460 Use above	
160A	4.50
160D	4.44
1727	4.14
1740	8.70
1741	8.77
2002	2.25
2041	5.82
20A156RBI	3.60
20A337RBI	3.45
20A686RBI	3.60
20A476RBI	3.60
2111	8.50
2113	12.50
21A000-0	1.35
21A000-2	2.10
21A104RBI	3.60
21A106RBI	3.54
21A155RBI	3.54
21A156RBI	3.54
21A225RBI	3.54
21A226RBI	3.54
21A336RBI	3.54
21A473RBI	3.54
21A[illegible]	3.54
21A686RBI	3.54
23A014-2	1.44
23A155RPC	2.43
25A014-[illegible]	1.35
25A014-4	1.35
27A013-7	1.35
4200-0	1.08
4204	2.04
4206	2.40
42A000CBI	4.14
42A105CBI	7.26
42A[illegible]CBI	7.26
42A155CBI	7.26
42A156CBI	7.26
42A225CBI	7.26
42A335CBI	7.44
42A336CBI	7.26
42A[illegible]CBI	7.59
42A[illegible]CBI	7.26
42A826CBI	7.26
4300-2	4.17
4303	4.80
4307	4.80
4308	4.80
4309	4.80
4400-2	4.17
4400-3	4.17
4403	5.28
4404	5.40
4405	5.40
4406	5.40
4407	5.40
4408	5.40
4409	5.40
4411	5.70
4500-2	4.17
4500-3	4.17
4500-4	4.17
4500-5	4.50
4501	5.40
4503	5.40
4505	5.70
4506	5.70
4527	4.50
4529	4.50
4532	5.75
4584	1.44
4624	1.[illegible]
4644	1.[illegible]
4650	1.74
4652	1.[illegible]
4672	1.[illegible]
46A013-5	3.15
46A014-2	3.00
46A014-5	1.[illegible]
46A126CPC	4.50
46A[illegible]	4.[illegible]
46A[illegible]	4.50
46A336CPC	4.[illegible]
46A826CPC	4.50
70F103AI	1.30
70F104AI	1.14
70F105AI	1.14
70F225AI	1.14
70F253AI	1.[illegible]
70F[illegible]AI	1.14
70F684AI	1.20
72F685AP	1.14
73F102AF	1.17
73F223AF	1.[illegible]
74F336AP	0.81
74F476AP	0.81
8814	4.80
9050	3.48
9051	3.48
913-C4	5.29
9230-16	1.08
9230-62	1.74
9250-151	1.77
X5495A	4.80
X5496C	4.80
B5495A	4.80
C5495A	4.80
KHZ455	2.40
RFC-14	2.70

ULTIMATE TRANSMATCH
(Found in recent ARRL H"books)

✓ Roller Inductor
Multronics 229-203....$39.95 —

✓ Turns counter
[illegible].....$[illegible] —

✓ Dial Knobs
Millen 10008..... 4.75 —

Variable Capacitors
Johnson-style
154-10.....44.40
154-507.....59.30
****BOTH FOR ONLY $71.00*****

Millen
16250.....43.20
16520.....35.30
16520A.....24.75

Insulators
✓ Standoff 31001.....$0.60 —
Feed Thru 32101.... 1.00
Balun support 31015.2.85

Shaft couplings
Non-insulated 39003..$1.00
Insulated 39002...1.55
Panel bushings 10066..0.85

Balun Supplies
T200-2.....$1.60
14Awg teflon cvd wire .30/ft
(Takes about 20 ft)
#27 tape available from your
local electrical distributor.

JACKSON BROTHERS MFG.

Planetary Ball Drive No. 4511/PAF: Simple and powerful epicyclic friction drive. Ratio 6:1. For ¼"shafts $5.10

Dual ratio epicyclic ball drive No. 4511/DRF: One coaxial shaft provides 6:1 reduction drive with 36:1 reverse verner fine tuning action. Overall length 2 3/8". 1 knob. $7.90.

10:1 Epicyclic drive No. [illegible]7: A new powerful reduction drive. Output torque greater than 30 oz.ins. 2 hole fixing. $8.75

6:1 Ball drive No. 4486C: 4" diameter aluminum scale with ¾" black plastic knob. 6:1 reduction in Knob. $12.00

Multiscale Dual Ratio Dial: Like Miller MD-4. Ratios approx 36:1 fine and 6:1 course. 4 3/4" X 3½" dial Model No. 4103 $14.70.

RARE DELICACIES

Teflon covered 14awg wire
for balun coil $0.30/ft.
(about 20 ft needed).
Telephone type 88 mhy toroid
$1.00 each.
Magnet wire (10ft.pieces)
#14 $0.80 #18 .40
#16 .60 #18-28 .25ea.
Dipped Mica capacitors

Most common values			35¢ each
CA3028A	$3.00	2N2222A	$0.75
LM741CH	1.50	SO-239	.60
MPF102	.90	5prong sckt	1.55
MPF105	.80	1N914	.2
		1N34A	.50

FM REPEATER LIST FOR SOUTHERN CALIFORNIA

IN	OUT	CALL	LOCATION / COVERAGE	NOTES
146.01	146.61	WR6ABB	Hollywood Hills / LA	
04	64	WR6ACF	Mt. Otay / San Diego	
07	67	WR6ABJ	Hollywood Hills / LA	
07	67	WR6AGQ	Bakersfield / Kern County	
10	70	WR6ACA	Saddle Peak / LA	RTTY Only
13	73	WR6AEF	Pomona / Pomona Valley	
13	73	W6NWG	Mt. Palomar / San Diego	
16	76	WR6AFX	Table Mountain / Wrightwood	
16	76	WR6ACT	Barstow	
19	79	WR6ACB	La Habra Hills / Orange County	Anaheim ARA
22	82	WR6ACD	Johnstone Peak / LA	AREC 30 sec timer
25	85	WR6ACJ	Crestline / LA	
28	88	WR6ACQ	Fullerton / Orange County	Hughes Fullerton
28	88	WR6AEP	Sulpher Mtn. / Ventura County	
28	88	WR6AFV	Riverside	
31	91	WR6ACE	McKittrick / Kern County	
34	94	WR6ADA	Palm Springs	Desert RATS
34	94	WB6GUA	Lancaster	
34	94	WR6ADQ	Victorville	
37	97	WR6AAC/6	Palos Verdes / LA	
147.60	147.00	WR6ABW	Hollywood Hills / LA	Private
63	03	W6GY	Hollywood Hills / LA	Private
66	06	WR6ABU	Los Angeles / LA	Private
69	09	WR6AAA	Catalina Island / LA	
72	12	WR6ADH	Monterey Park / LA	Autopatch[1]
75	15	WR6ACO	Pine Cove / LA	Private
78	18	WR6ABV	Contractors Pt. / LA	Private
81	21	WR6ABA	Mt. Washington / LA	
84	24	WR6ABN	Mt. Lee / LA	
87	27	WR6ABQ	Mt. Disappointment / LA	LA County RACES
90	30	WR6AEJ	Hollywood Hills / LA	
93	33	WR6ACK	Santa Monica / LA	Autopatch[2]
96	36	WR6AAD	Mt. Wilson / LA	Private
96	36	WR6AAE	Palos Verdes / LA	Private
99	39	WR6ADW	Mt. Palomar / San Diego	Private
435	146.40	WR6ABE	Mt. Wilson / LA	

AUTOPATCH NOTES

72	12
93	33

1. Up code is (*, 4, #); down (*, 9, #). Phone coverage of all 213, part of 714 and 805 area codes. Ramona Radio Club operates this repeater.
2. Up code (*); down (#). Phone coverage of local Santa Monica area. Split site repeater.

SIMPLEX CHANNELS

146.43, 46, 49, 52, 55, 58
147.42, 45, 48, 51, 54, 57

47, 72 147.12 — WR6AEB — LOMPOC — OPEN
16 16 146.76 — — CAL POLY — INTERMITTENT
28 - 88 — WR(?) — SANTA MARIA — OPEN (RACES)
> 31 - 91 — WR6ACE — (MCKITTRICK) BAKERSFIELD — OPEN
47.60 147.00 — WR6AFI — SANTA BARBARA — OPEN

WEST COAST REPEATER LIST

3/7/75

INPUT FREQ	OUTPUT FREQ	CALL	LOCATION	STATE	ACCESS	NOTES
146.01	146.61	WR6ABB	HOLLYWOOD HLS	CA		OV
146.01	146.61	WR6ACW	RESCUE (SAC VLY)	CA		O
146.01	146.61	WR6AFO	MEADOW LAKES	CA		O
146.01	146.61	WR6AFR	JUNIPER HILLS (PALMDALE)	CA		OV
146.01	146.61	WR6AGG	MARIN CO.	CA		O
146.01	146.61	WR7	BREMERTON	WA		
146.04	146.64	WR6ABD	SAN JOSE(LOMA PRIETA)	CA		OV
146.04	146.64	WR6ACF	SAN DIEGO	CA		OV
146.04	146.64	W6CPK	CLEAR LAKE	CA		O
146.04	146.64	WR7ABR	PHOENIX	AZ		O
146.07	146.67	WR6ABJ	WEST LA	CA		OV
146.07	146.67	WR6AGQ	BAKERSFIELD (MT ADLAIDE)	CA		OV
146.07	146.67	WR7	WENATCHEE	WA		
146.10	146.70	WR6ACS	MT TAMALPAIS	CA		O
146.13	146.73	WR6AEE	LOS ALTOS (MONTEBELLO RDG)	CA		O
146.13	146.73	WR6AEF	POMONA	CA		O
146.13	146.73	WR6AES	SANTA ROSA	CA		O
146.13	146.73	WR6AGH	VENTURA (HALL MTN.)	CA		OV
146.13	146.73	WR6AGY	HAUSER PK (PALMDALE)	CA		OV
146.13	146.73	W6NWG	SAN DIEGO (MT PALOMAR)	CA		O
146.13	146.73	WR7AEF	MT. CONSTITUTION	WA		O
146.16	146.76	WR6ACL	HONOLULU	HI		OV
146.16	146.76	WR6ACT	BARSTOW	CA	B1800	OV
146.16	146.76	WR6ADE	SAN JOSE	CA		OV
146.16	146.76	WR6ADI	AUBURN	CA		O
146.16	146.76	WR6ADS	SAN LUIS OBISPO	CA		O
146.16	146.76	WR6AFX	TABLE MT (MOJAVE DES)	CA		OV
146.16	146.76	WR6AFZ	REDDING	CA		O
146.16	146.76	WR6AGI	STOCKTON	CA		OV
146.16	146.76	WR6AJL	LAGUNA PK (SAN DIEGO)	CA		OV
146.16	146.76	WR7ABJ	ASTORIA	OR		O
146.16	146.76	WR7ABQ	PHOENIX	AZ		O A
146.16	146.76	WR7AEL	KINGMAN (INTLOCK 34-94)	AZ		OV
146.19	146.79	WR6ACB	LA HABRA	CA		OV
146.19	146.79	WR6ACI	SAN FRANCISCO	CA		OV
146.19	146.79	WR6ADU	SACRAMENTO	CA		O
146.19	146.79	WR6AFS	FRESNO	CA		OV
146.19	146.79	WR7	BOTHELL	WA		
146.20	146.80	WR6AGC	OAHU (HONOLULU)	HI	#1	OV
146.22	146.82	WR6ABM	SAN FRANCISCO AREA	CA		OV
146.22	146.82	WR6ACD	JOHNSTONE PEAK (LA)	CA		OV
146.22	146.82	WR6AEL	SAN LUIS OBISPO	CA		OV
146.22	146.82	WR6AGF	HAWAII (MAUNA LOA)	HI	#2	OV
146.22	146.82	WR7ABC	RENTON	WA		O
146.22	146.82	WR7ABT	PHOENIX	AZ		O
146.22	146.82	WR7ABX	MOSCOW	ID		O
146.22	146.82	WR7AEB	ANCHORAGE	AK		O
146.25	146.85	WR6ACJ	CRESTLINE	CA		OV
146.25	146.85	WR6ADY	SAN FRANCISCO AREA	CA		OV
146.25	146.85	WR6AFC	THOUSAND OAKS	CA	B1950	OV
146.28	146.88	WR6ACQ	FULLERTON	CA		OV
146.28	146.88	WR6ACV	STOCKTON (MT. OSO)	CA		OV
146.28	146.88	WR6AEP	OJAI (VENTURA)	CA		OV
146.28	146.88	WR6AFP	OAKLAND	CA		O
146.28	146.88	WR6AFV	RIVERSIDE	CA		OV
146.28	146.88	WR6AGF	OAHU (DIAMOND HEAD)	HI		OV
146.31	146.91	WR6ACE	MCKITTRICK (KERN CO.)	CA		O
146.31	146.91	WR6AED	RUNNING SPRINGS	CA		
146.31	146.91	WR6AEN	EL DURADO HLS(SACRAMENTO)	CA		O
146.31	146.91	WR6AEO	MT ST HELENA(PETALUMA)	CA		
146.31	146.91	WB6IYW	SANTA BARBARA	CA		
146.34	146.94	WR6ACG	BISHOP	CA		OV
146.34	146.94	WR6ACU	FRESNO	CA		OV
146.34	146.94	WR6ADA	PALM SPRINGS	CA		OV
146.34	146.94	WR6ADF	OAKLAND	CA		
146.34	146.94	WR6ADQ	VICTORVILLE	CA		OV
146.34	146.94	WR6AGD	MAUI (MT. HALEAKALA)	HI	#2	OV
146.34	146.94	WR6AGL	COHASSET	CA		O
146.34	146.94	WR6AGT	EUREKA	CA		O A
146.34	146.94	WR6AGU	MT PIERCE (SCOTIA)	CA	B1800	O
146.34	146.94	WB6GUA	LANCASTER	CA		O
146.34	146.94	WR7ABE	PORTLAND	OR		O
146.34	146.94	WR7ABI	RENO	NE	B2400	O
146.34	146.94	WR7ABQ	PHOENIX	AZ		O
146.34	146.94	WR7ACB	CHEHALIS	WA		
146.34	146.94	WR7AEH	LAS VEGAS	NE		
146.34	146.94	WR7AEL	KINGMAN (INTLOCK 16-76)	AZ	B1800	OV
146.34	146.94	VE7RPT	VANCOUVER	BC		
146.37	146.97	WR6AAC/6	PALOS VERDES	CA		OV
146.37	146.97	WR6ABX	BERRYESSA PK (WOODLAND)	CA		O
146.37	146.97	WR6AEZ	MONTEREY	CA	W1336	O
			****			
147.435	146.40	WR6ABE	MT WILSON (SO. CALIF)	CA		OV
147.60	147.00	WR6AFI	SANTA BARBARA	CA		OV
147.63	147.03	WR6AEV	BERKELEY	CA		
147.63	147.03	WA6PPR	SAN DIEGO	CA		
147.66	147.06	WR6ACP	MT DIABLO	CA		
147.69	147.09	WR6AAA	CATALINA (SO. CALIF)	CA		OV
147.69	147.09	WR6ABY	SAN FRANCISCO AREA	CA		OV
147.69	147.09	WA6ACU	MEADOW LAKES	CA		O
147.72	147.12	WR6ADH	MONTEREY PARK	CA		OVA
147.72	147.12	WR6AEB	SANTA MARIA	CA		
147.72	147.12	WR6AFF	WOODLAND	CA		
147.78	147.18	WR6AFU	MT ST HELENA	CA		
147.81	147.21	WR6ABA	LA (MT. WASHINGTON)	CA		O
147.84	147.24	WR6ABN	MT LEE (LA)	CA		OV
147.84	147.24	WR6ADC	SAN FRANCISCO	CA		OV
147.87	147.27	WR6ABQ	MT DISAPOINTMENT (LA)	CA		OV
147.87	147.27	WR6AEI	SAN FRANCISCO AREA	CA		O
147.90	147.30	WR6ADR	SAN FRANCISCO AREA	CA		O
147.90	147.30	WR6AEJ	WEST LA	CA		OV
147.90	147.30	WR6AFA	FRESNO	CA		OV
147.90	147.30	WR6AGK	SACRAMENTO	CA		
147.93	147.33	XE2IO	BAJA (CLEAR CHANNEL)	MEX		
147.99	147.39	WR6ACY	BIRCH HILL (SAN DIEGO)	CA		
147.99	147.39	WR6ADJ	PALOS VERDES	CA		
147.99	147.39	WR6ADX	LOS GATOS	CA		O
147.99	147.39	WR6AFL	SAN DIEGO	CA		
147.99	147.39	WR6AGJ	MT VACA	CA		

*** NOTES ***
O = OPEN REPEATER
P = PRIVATE, CLOSED REPEATER
V = VERIFIED
A = AUTOPATCH

160-METER ALLOCATIONS

INPUT POWER (WATTS)	
0	No operation, day or night
1	100 day, 25 night
2	200 day, 50 night
3	500 day, 100 night
4	1000 day, 200 night
5	125 day, 25 night
6	250 day, 50 night

SEGMENTS (KHZ)	
A	1800-1825
B	1825-1850
C	1850-1875
D	1875-1900
E	1900-1925
F	1925-1950
G	1950-1975
H	1975-2000

CANADIAN	A	B	C	D	E	F	G	H
B.C.	3*	3	3	5	0	0	0	0
Alta.	3*	3	3	3	5	0	0	5
Sask.	3*	3	3	3	3	5	5	3
Man.	3*	6	6	6	6	6	6	3*
Ont., N. of 50 deg. N. Lat.	3	5	5	5	5	0	0	6
Ont., S. of 50 deg. N. Lat.	3*	6	5	0	0	0	0	5
P.Q., N. of 52 deg. N. Lat.	5	0	0	5	5	0	0	6
P.Q., S. of 50 deg. N. Lat.	3	6	5	0	0	0	0	0
N.B., N.S., P.E.I.	3	6	5	0	0	0	0	0
Newfoundland	3	5	5	0	0	0	0	0
Labrador	6	0	0	0	0	0	0	0
Yukon	3*	3	3	5	0	0	0	0
District of Mackenzie	3*	3	3	3	5	0	0	5
District of Keewatin	3	5	5	3	6	0	0	6
District of Franklin	0	0	0	0	5	0	0	5

*The power levels 500 day - 100 night may be increased to 1000 day - 200 night when authorized by a Radio Inspector of the Department of Communications.

American Radio Relay League, Newington, Connecticut, U.S.A. 06111

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ESTERO AMATEUR RADIO CLUB MEMBERSHIP

September 1974

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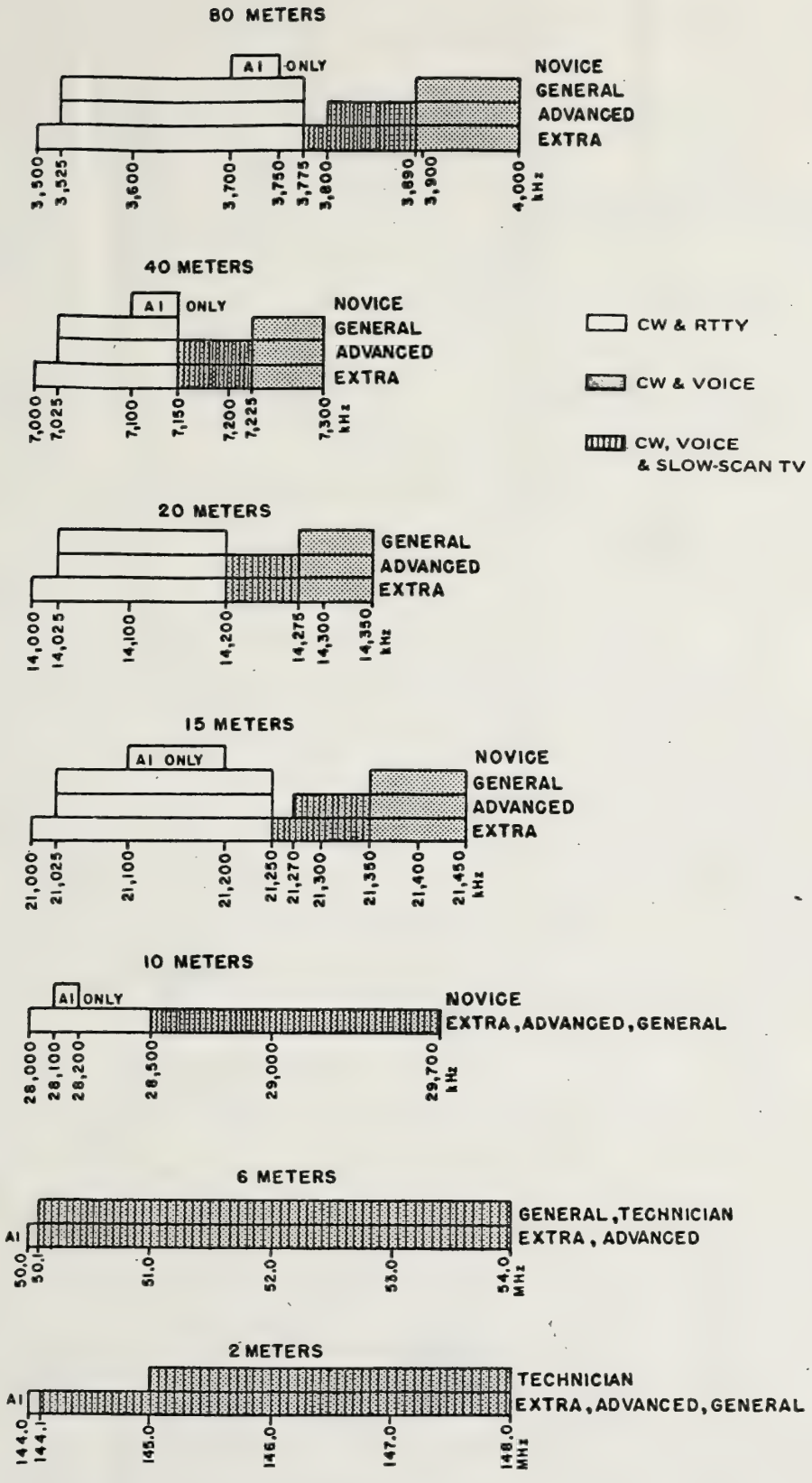
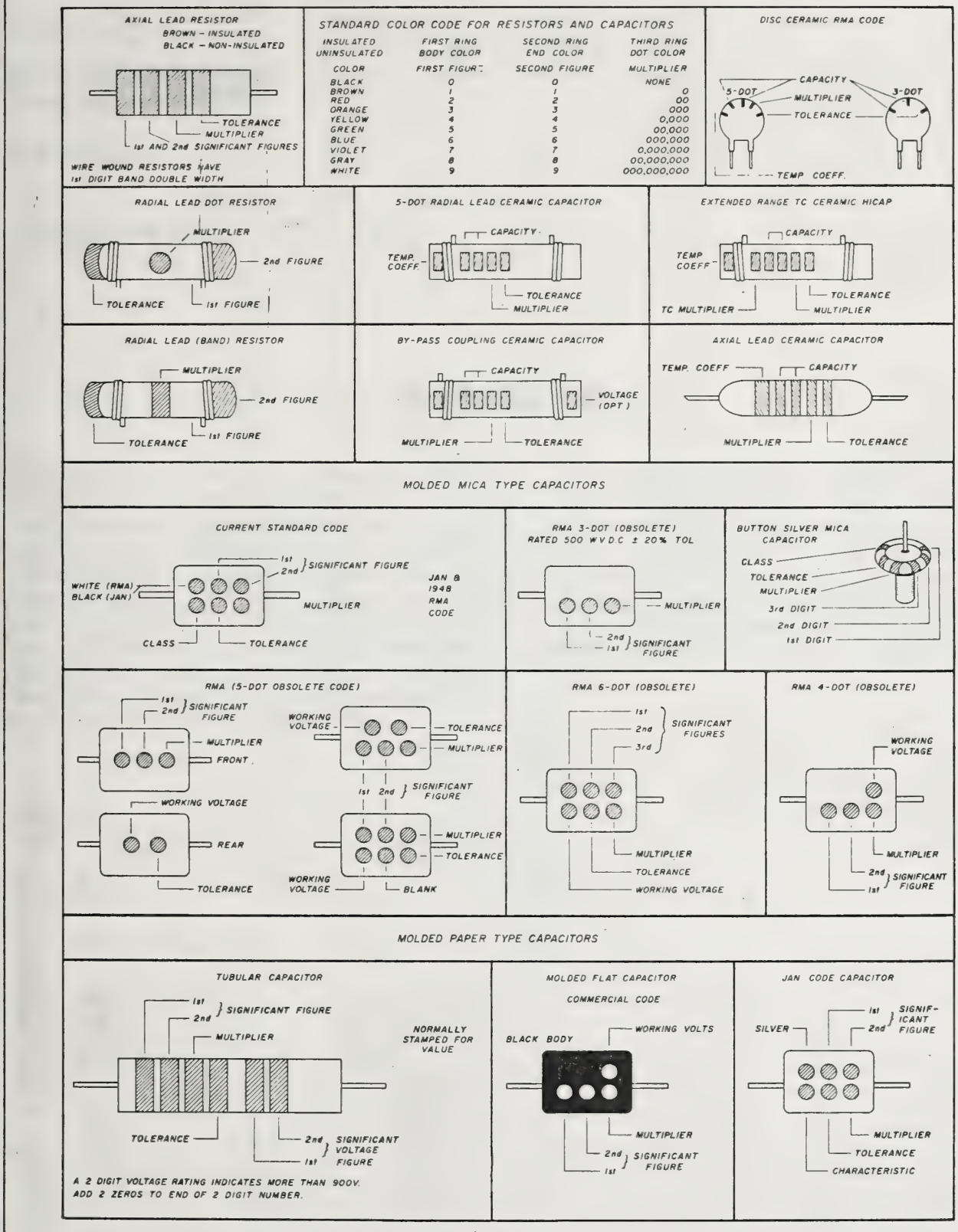
	AMBORN, Phil	E	W6PA		
	BARNES, Edith	T	WB6YCH	943 Anchor, Morro Bay 93442	772-7658
	BEALL, Everett	G	K6YHK	715 E Cook, Sta Maria	WA5-2139
	BETHARD, Chas.	A	W6MTK	1238 6th St. BP, Los Osos 93402	528-0588
	BOYE, Conrad	T	WA6OWQ	2232 El Dorado, Los Osos	528-2447
	CORDIER, Vern	A	WA6GOR	717 Lilac Dr., Los Osos	528-1877
Y +	COREY, Chuck	A	W6EBC	4971 Hacienda Ave. SLO 93401	544-5298
N x	CRUMB, Myer	A	WB6ECM	1297 Rich Ct. SLO	543-2432
	DAVIS, Walt	A	K6KZT	2255 Alexander, Los Osos	528-3181
N +	EELLS, Bea	A	W6JXU	209 Jeffrey Dr., SLO	543-3675
N +	EELLS, Floyd	A	W6FNP		
	FALL, Acy	G	W6BNF	1701 Los Osos V. Rd. Los Osos	528-0282
	FULTON, Ralph	N	WN6HIK	Bella Vista Tlr.Pk. Cayucos	995-1637
	GALLAGHER, Jim	G	WA6VVK	1900 Tapidero St. Los Osos	528-3885
	GOLDMAN, Len	G	WA6DDQ	180 Capri, Morro Bay	772-2317
	GRIGGS, John	A	W6KW	1273 13th St., BP, Los Osos	528-0873
	GRIGGS, Roxanna	A	K6ELO		
	HARTH, Jeff		WN6TPD	128 Randall, Morro Bay	772-3078
	JENKINS, Don	A	WB6PGK	2487 Greenwood, Morro Bay	772-2877
Y +	JOHNSON, Ernie	A	W6ZRR	265 Almond SLO	543-7641
	JOHNSON, Irwin	A	W6CDN	1900 Tapidero St, Los Osos	528-3885
	JONASSON, Roy	A	K6TOE	365 Surf Apt. 4 Morro Bay	772-7120
	KLARER, Herb	A	WB6VGC	10855 Colorado Atascadero	466-1265
	KLARER, Louise	G	WA6FHH		
	LEE, Tony	G	WB6PYD	Box 818 Morro Bay	772-8428
	LOCKE, John		WN6SXN	2133 Bush Dr., Los Osos	528-1395
Y +	LONG, Walt	A	W6JNV	1690 Fairview Ave SLO	544-4751
	McGRATH, Jim	C	K6JHZ	485 S Bay Blvd, Morro Bay	772-8312
	PARKER, Jim		WN6CRR	P.O. Box 790, Morro Bay	772-8732
	PEIRCE, Wendell	A	W6FSJ	1246 9th St. BP, Los Osos	528-2735
	RANDLE, Tex	A	W6EIB	3281 Tide St., Morro Bay	772-3124
	SCHWENGER, Karl	G	WA6NFB	528 Skyline Los Osos 93402	528-0309
	SMARLING, Oscar	C	WB6FOG	918 Marina Morro Bay 93442	772-8242
	STOVALL, Desmond	E	W6ECY	1215 15th St. BP, Los Osos	528-2934
	SUTHERLAND, Bud	G	WA6INZ	Box 411, Santa Margarita 93453	438-5746
	TAUXE, Bob	E	W6JTA	1535 13th St BP, Los Osos	528-0755
Y x	TIFFIN, John	G	W6TYR	2461 Johnson, SLO 93401	543-2655
	WARNER, Roy	A	WA6DHS	1599 12th Street BP, Los Osos	528-0891
	WOOD, Mark	A	WA6QYJ	1530 Bayview Heights Dr. L.O.	528-0768
N x	Friedman, Ken		WN6EQS	1836 Vermont SLO	543-1307



New U.S. amateur suballocations effective November 22, 1972. Conditional Class privileges are the same as General Class. (See page 78, November 1972 *QST*.) Copies of this chart are available from ARRL Headquarters. Send a stamped, addressed envelope and ask for the "Member's Guide to the U.S. Ham Bands."



Most resistors are prominently color-coded for easy identification. This chart should help dispel any confusion as to color-coding schemes.

instructions

FOR THE

HEATH

RF PROBE

MODEL PKW-3A

INTRODUCTION

The Heath Model PKW-3A RF Probe extends the usefulness of any DC voltmeter that has a 10 or 11 MΩ input impedance by providing RF voltage measurement capability. The frequency response of the Probe is flat from 1000 Hz to over 100 MHz. Printed circuit board wiring reduces circuit capacitance and therefore improves high frequency response. The grounded probe body housing keeps hand capacitance effects and extraneous signal pickup from producing false voltage readings. All readings reflect equivalent rms (root-mean-square) volts.

You can easily measure RF voltages of 90 volts or less, as well as RF voltages superimposed on DC potentials of 1000 volts or less. Accuracy of the Probe is maintained within approximately 10%, which is adequate for most RF work. Provisions for improved accuracy at low RF voltages (less than 1 volt) are explained on Page 2. If you incorporate this change, you will be able to measure a maximum RF voltage of 30 volts rms.

Printed in the
United States of America

HEATH COMPANY
BENTON HARBOR, MICHIGAN 49022

597-2063

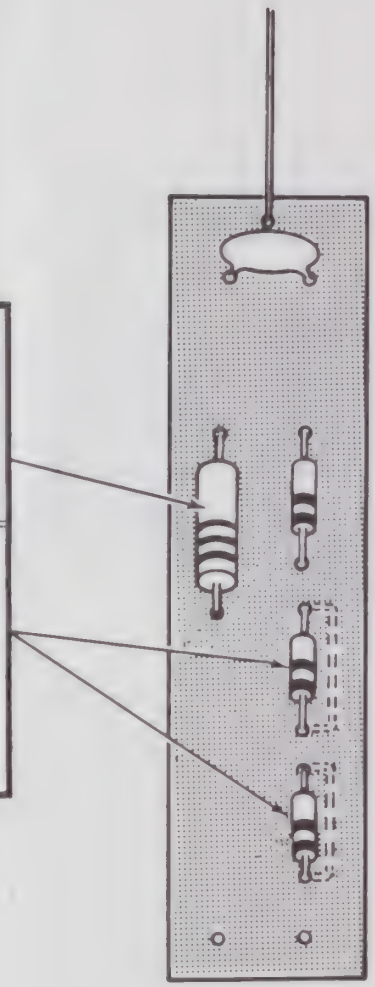
OPTIONS

IMPEDANCE AND VOLTAGE RANGE

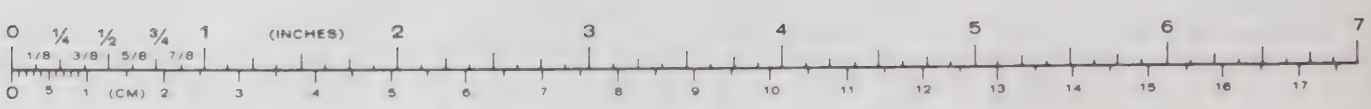
START

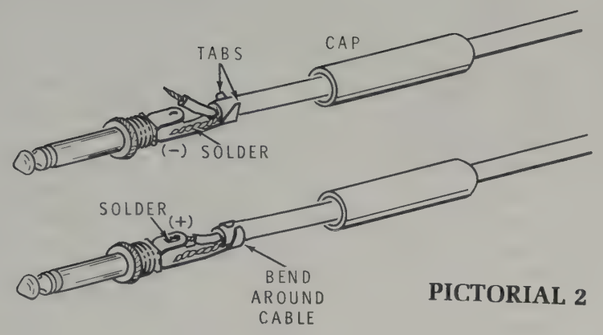
This RF Probe is wired to be used with any voltmeter that has a 10 MΩ input impedance. If you wish to use it with a voltmeter that has an 11 MΩ input impedance, replace the indicated 3.9 MΩ resistor with the supplied 4.7 MΩ resistor.

If all applications for which you plan to use this probe involve RF voltages of less than 30 volts rms, substitute a 1-1/4" bare wire in place of each of the two indicated diodes. This will increase the accuracy of the probe at very low voltages (less than 1 volt), but will limit the maximum RF voltage to 30 volts rms.



PICTORIAL 1





PICTORIAL 2

PHONE CONNECTOR

If you will be using your RF Probe with a DC voltmeter that accepts a phone plug, complete the following steps.

Refer to Pictorial 2 for the following steps.

( ) Cut off the dual banana plug.

( ) Refer to Detail 2A and prepare the cut-off end of the shielded cable as shown.

( ) Unscrew the cap from the phone plug.

( ) Insert the prepared end of the shielded cable through the phone plug cap.

NOTE: In the following steps, you will connect the prepared cable to the phone plug as shown in Pictorial 2. To avoid overheating the cable insulation, first apply a film of solder to the phone plug terminals; then hold the wires to the phone plug and apply just enough heat to melt the solder. Be sure that the outer insulation extends into the tab area.

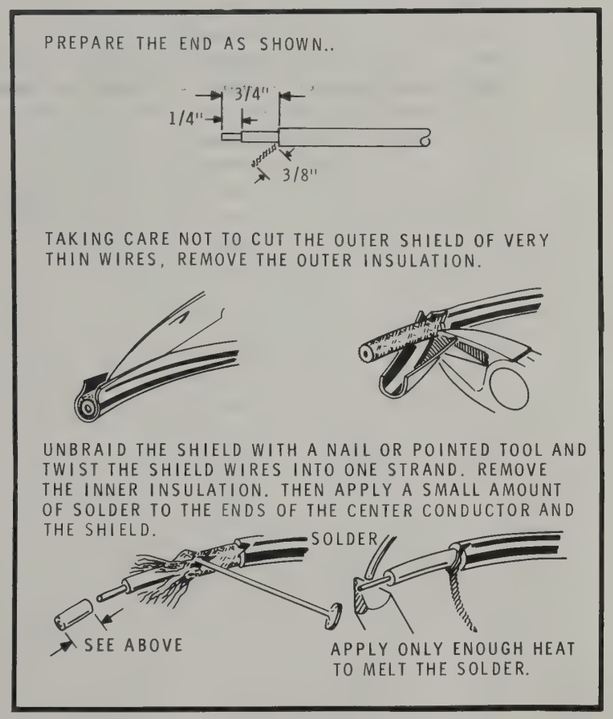
Connect the end of the shielded cable to the phone plug as follows:

( ) Shield lead to the (–) terminal. Be careful not to melt or burn the inner plastic insulation of the cable.

( ) Inner lead to the (+) terminal. Be sure the phone plug cap will still fit over the leads. Use only enough heat to melt the solder and make a good connection.

( ) After the leads have cooled, use pliers to bend the tabs on the phone plug over to secure the cable.

( ) Screw the cap onto the phone plug.



Detail 2A

APPLICATION

You can connect your PKW-3A RF Probe to any DC voltmeter that has a 10 MΩ (or 11 MΩ) input impedance. The output voltage of the Probe is positive DC, and the voltmeter should be set accordingly. It may be used as a signal tracer and gain analyzer, as well as an RF voltage measuring device. Because this Probe is designed primarily for RF applications, signals below 1000 Hz will read low. Disconnect the RF Probe and use the AC section of the voltmeter for these low frequencies. (NOTE: The capacitive effect of the AC test leads will be negligible at frequencies below 1000 Hz.)

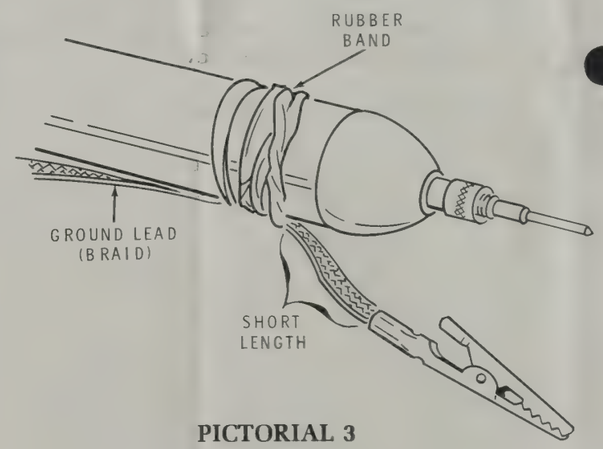
If a receiver is not functioning properly, you can use the Probe as a signal tracer in the following manner: First, connect the Probe to the output of the second detector stage and note the amount of RF energy that is present there. If there is no indication, move the Probe back to the output of the last IF stage and observe the meter again. If there still is no indication, move the Probe to the input of this stage and, if necessary, further forward toward the RF input in this step-by-step manner. The point at which RF energy first appears will indicate that the trouble is in the circuit immediately following this point. (Local oscillator operation can be checked by connecting the Probe to the oscillator.) Remember that probe sensitivity is limited by the sensitivity of the voltmeter, so it is unlikely that you will obtain satisfactory indications in the RF and mixer stages of a receiver.

Use this same procedure to check RF or IF amplifier gain. Write down the readings you obtain and divide the output voltage by the input voltage. The answer you obtain will be the gain of the stage or stages.

RF signals present in transmitters can also be measured, providing the ratings of the probe are not exceeded.

Remember that 90 volts (30 volts for single diode wiring) is the maximum AC RF voltage that should be applied to the Probe. DC voltages up to 1000 volts can be connected to the Probe safely as long as the superimposed RF voltage does not exceed the RF voltage limit.

For measurements in circuits where the RF frequency is less than 50 MHz, the ground lead length and position is generally not crictical. For measurements of higher frequency signals, the frequency response the Probe can be maintained "flat" by securing the ground lead firmly to the probe body with a rubber band as shown in Pictorial 3. This provides a short length ground return having a low inductance.



PICTORIAL 3

SERVICE INFORMATION

The following Heath Company services are available if you need them: Replacement Parts, Technical Consultation, and Factory Service. Address all correspondence to:

HEATH COMPANY
Benton Harbor, Michigan 49022

For prompt service, use a separate letter for each department you write to.

Replacement parts and repair service are also available at your nearest Authorized Service Center or Heath Electronic Center. These Centers are listed in your Heath Catalog.

REPLACEMENT PARTS

If a replacement part is needed, please include the following information in your letter:

1. Part number and description.
2. Model Number and Series Number of the equipment.

If your equipment is in the Warranty period, add:

3. Date of purchase.
4. Nature of defect.

Heath Company will fill your order promptly. Please DO NOT RETURN PARTS unless they are requested. Parts that are damaged through carelessness or misuse by the customer will not be replaced without cost.

TECHNICAL CONSULTATION

You can write to our Technical Consultants for help with any Heath equipment, or for answers to any questions about the use of this equipment.

The completeness and accuracy of the advice mailed back to you depends entirely on the information in your letter. Be sure to include:

1. The Model Number and Series Number of the equipment (on blue and white Identification label).
2. Date of purchase.
3. An exact description of the difficulty. Include switch positions, connections to other units, operating procedures, voltage reading, and any other information you think might be helpful.
4. List everything you have done in attempting to correct the difficulty.

FACTORY SERVICE

If you do not have qualified repair services at your disposal, you can return your equipment to the Heath Company Service Department to have it repaired for a minimum service fee. (Equipment that has been modified will not be accepted for repair.) Refer to Shipping Instructions for details on how to package and ship the equipment.

To be eligible for replacement parts under the terms of the Warranty, equipment returned for factory service must be accompanied by the invoice or the sales slip, or a copy of either. (If you send the original invoice or sales slip, it will be returned to you.)

SHIPPING INSTRUCTIONS

Check the equipment to see that all parts are in place. Then, wrap the equipment in heavy paper. Place the equipment in a strong carton, and put at least three inches of resilient packing material (shredded paper, excelsior, etc.) on all sides between the equipment and the carton.

Seal the carton with gummed tape and tie it with a strong cord. Ship it by prepaid Express or insured Parcel Post to:

HEATH COMPANY
Benton Harbor, Michigan 49022

Attach a letter, containing the following information to the outside of the carton:

1. Your name and return address.
2. Date of purchase.
3. A brief description of the difficulty.
4. Your authorization to ship the repaired unit back to you C.O.D. for the service and shipping charges, plus the cost of parts not covered by the Warranty.

YOUR HEATH FACTORY ASSEMBLED PRODUCT ONE-YEAR LIMITED WARRANTY

If you are not satisfied with our service - warranty or otherwise, or with our products, write directly to our Director of Customer Services, Heath Company, Benton Harbor, Michigan 49022. He will make certain your problems receive immediate, personal attention.

Our attorney insists that we describe our warranty using all the necessary legal phrases in order to comply with the new warranty regulations. Fine. Here they are.

For a period of one year after purchase, Heath Company will replace or repair free of charge any product that is defective either in materials or workmanship. We warrant that during the first full year after purchase, our products, when used in accordance with our printed instructions, will meet published specifications.

If your Heath factory-assembled product malfunctions or fails to operate at any time during the warranty period, through no fault of yours, we will service it free upon proof of purchase and delivery at your expense to the Heath factory, or any Heathkit Electronic Center, or any of our authorized overseas distributors.

You will receive free consultation on any problem you might encounter in the use of your Heath product. Just drop us a line or give us a call. Sorry, we cannot accept collect calls.

Our warranty does not cover and we are not responsible for damage caused by misuse or fire or unauthorized modifications to or uses of our products for purposes other than advertised. Our warranty does not include reimbursement for customer assembly or set-up time.

This warranty covers only Heath factory-assembled products and is not extended to allied equipment or components used in conjunction with these products. **We are not responsible for incidental or consequential damages.** Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

HEATH COMPANY
Benton Harbor, Michigan 49022

The Heath Company reserves the right to discontinue products and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

HEATHKIT DEMODULATOR PROBE

Model #337-C

The #337-C Demodulator Probe greatly extends the usefulness of any oscilloscope. It provides a means of showing modulation envelopes of RF or IF carriers as found in radio and television receivers. Thus the oscilloscope can be used as a signal tracer, a gain analyzer and an alignment indicator. Many other uses will become evident as the user becomes more familiar with the characteristics of the probe and oscilloscope combination.

A well shielded probe with the detecting elements contained in the housing is necessary for satisfactory indications at high RF frequencies. The Heathkit #337-C Demodulator Probe meets these requirements. Input leads are extremely short in order to eliminate extraneous signal pickup which can give false readings. The metal probe housing is grounded to prevent hand capacity effects from causing deflection of the trace. Etched circuit wiring cuts down circuit capacity, improving high frequency performance.

The input capacitor is rated at 500 volts DC and the probe should not be applied to circuits where DC voltages higher than this are found. AC or RF voltages in excess of 30 volts RMS should not be measured as damage to the crystal diode may result. However, the probe can be connected to high voltage points in a unit, such as the plate of a tube, as long as the DC voltage present does not exceed the 500 volt DC limit.

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION
1-20	1	10 KΩ resistor
1-23	1	27 KΩ resistor
21-11	1	150 μμf condenser
21-140	1	.001 μfd condenser
56-26	1	Crystal diode
70-4	1	Acetate insulator sleeve
70-10	1	Black banana plug sleeve
70-11	1	Red banana plug sleeve
85-3	1	Etched circuit board
250-355	4	Sheet metal screw
260-1	1	Alligator clip
340-2	1	Bare wire
343-2	1	Shielded test lead
345-1	1	Flat braid
390-13	1	Label
438-47	2	Banana plug
459-2	1	Red probe tip end (tapped)
459-3	1	Black probe tip end (not tapped)
476-8	1	Aluminum probe body
477-3	1	Solderless phone tip
331-6		Solder
	1	Instruction sheet (See part number below.)

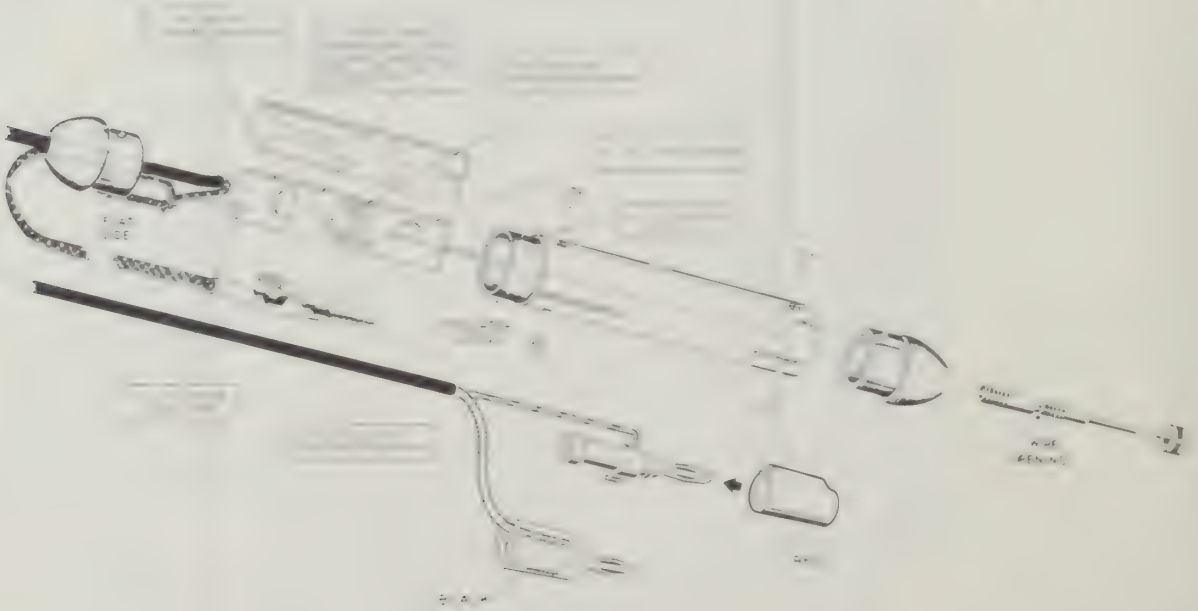
PROBE CONSTRUCTION

ROSIN CORE SOLDER HAS BEEN SUPPLIED WITH THIS KIT. THIS TYPE OF SOLDER MUST BE USED FOR ALL SOLDERING IN THIS KIT. ALL GUARANTEES ARE VOIDED AND WE WILL NOT REPAIR OR SERVICE EQUIPMENT IN WHICH ACID CORE SOLDER OR PASTE FLUXES HAVE BEEN USED. IF ADDITIONAL SOLDER IS NEEDED, BE SURE TO PURCHASE ROSIN CORE (60:40 OR 50:50 TIN-LEAD CONTENT) RADIO TYPE SOLDER.

The pictorial clearly shows assembly detail of the probe and etched circuit board. Begin construction by mounting the components on the circuit board in the numbered sequence shown on the pictorial. All parts will mount on the unmarked side of the board, with their leads coming out on the etched side. Generally, it is best to mount all components before soldering, bending the leads over slightly to lock the parts in place. After all parts are secured, the board should be turned over and each lead soldered at the point where it comes through with a 25 or 50 watt soldering iron. After soldering, all leads should be clipped off.

For best soldering results, a 25 to 50 watt iron is recommended. The tip should be clean and well tinned in order to obtain a quick, clean solder joint. Hold the tip of the iron at the junction of the component lead and the etched board conductor, and apply solder at the same point until a good connection is obtained between the two parts. When all parts are clean, the connection can be made very quickly, preventing heat damage to resistors and condensers. In order to protect crystal diodes, a clamp, needle nosed pliers or some other type of heat barrier should be clamped on the diode lead between the diode and connection, on the opposite side of the board from the connection.

Place the length of flat braid and the shielded cable through the black probe end. Remove 1" of black outer insulation. Push the braid back until a bulge develops near the end of the outer insulation. Bend the end over, poke a hole in the shield braid and pull center conductor through as shown. Bend the flat braid and shield braid back together over the flat portion of the probe end and solder together. Make sure that the two braids are as flat as possible or it will be difficult to install the probe body.



Fit the insulator strip tight against the probe end and solder the shield lead coming from the circuit board to the two braids near the center conductor. Cut the center conductor to a length sufficient to reach the hole marked "lead." Strip away 1/8" of insulation and solder the center conductor at this point. Cut off all excess wire at this end.

Prepare the probe body by inserting the large sleeve. Slip the entire assembly over the circuit board and rear probe end and secure with two sheet metal screws. Install the phone tip in the red probe end and remove the collar. Insert this end into the probe body, making sure that the lead from the circuit board tip appears through the hole at the side of the tip. Secure with the remaining sheet metal screws. Wrap the wire around the tip in the space provided and reinstall the collar. Solder an alligator clip to the end of the flat braid.

At the opposite end of the cable, strip away 3" of black outer insulation. Prepare as before. Install the banana plugs, with the probe ends, on the center conductor and shield as shown. This completes the assembly of the Demodulator Probe.

USE OF THE PROBE

Standard RF signal tracing techniques can be observed using the oscilloscope and Demodulator Probe. RF and IF signals can be traced from the second detector of the unit in question back to the mixer and antenna circuits. The probe can be applied to the grid and plate of each stage without the necessity of using isolation capacitors, etc. It must be remembered that the sensitivity of the probe is limited by the characteristics of the oscilloscope and it will be difficult to obtain adequate indications in low level circuits. However, strong signals will usually be evident from the grid of the first IF stage to the second detector. Indications in the first stages may require the use of a signal generator to provide adequate signal level. Television sweep alignment procedures are made easier by use of the probe, for it is possible to check waveforms at different points in the IF circuits as well as the overall bandpass characteristics in tuners and boosters.

SPECIFICATIONS

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

WARRANTY

The Heath Company warrants parts in its kits for 90 days after shipment. Under this warranty, we will exchange any defective part returned prepaid within the 90 days. If a part is defective, its replacement is shipped prepaid by us anywhere in the continental United States or to APO and FPO addresses. Shipments to all other areas are FOB factory. Heath's obligation is limited to such replacement or repair by Heath, and Heath is not responsible under this warranty or otherwise for any consequential damage or other loss in connection with the purchase, assembly, or use of the kit or parts. Use the Parts Order Form in the kit to notify us of the defective part and return instructions will be sent to you, or contact any Heathkit Electronic Center.

Questions relating to repairs or warranty replacement in the continental United States (APO and FPO included) should be addressed to Heath Company, attention: Customer Relations, or the nearest Heathkit Electronic Center. In all other areas please contact the authorized Heathkit representative in your country, or Heath Company, attention: International Division.

HEATH COMPANY
Benton Harbor, Michigan 49022

SCHEMATIC OF THE
DEMODULATOR PROBE #337-C

REPLACEMENT PARTS PRICE LIST

PART No.	PRICE Each	DESCRIPTION
1-20	.10	10 KΩ resistor
1-23	.10	27 KΩ resistor
21-11	.10	150 μμf condenser
21-140	.10	.001 μfd condenser
56-26	.30	Crystal diode
70-4	.10	Acetate insulator sleeve
70-10	.10	Black banana plug sleeve
70-11	.10	Red banana plug sleeve
85-3	.25	Etched circuit board
250-355	.05	Sheet metal screw
260-1	.15	Alligator clip
340-2	.05/ft	Bare wire
343-2	.10/ft	Shielded test lead
345-1	.10/ft	Flat braid
390-13	.10	Label
438-47	.15	Banana plug
459-2	.15	Red probe tip end (tapped)
459-3	.10	Black probe tip end (not tapped)
476-8	.40	Aluminum probe body
477-3	.15	Solderless phone tip
331-6	.15	Solder

The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage and handling. Outside the U.S.A. parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties and rates of exchange.

instructions

FOR THE

HEATHKIT UNIVERSAL OSCILLOSCOPE PROBE

MODEL PK-1

SPECIFICATIONS

Input Impedance	NORMAL POSITION:	Direct-coupled from probe tip to oscilloscope input.
	X10 POSITION:	2.4 MΩ shunted by 20 pF when wired for use with 3.6 MΩ input, 10 MΩ shunted by 20 pF when wired for use with a 1 MΩ input.
Maximum DC Voltage	600 volts.	

The Heath Company reserves the right to discontinue instruments and to change specifications at any time without incurring any obligation to incorporate new features in instruments previously sold.

INTRODUCTION

The Heathkit Model PK-1 Universal Oscilloscope Probe permits you to observe signals that would otherwise be affected by the relatively high input capacitance of an oscilloscope and its coaxial input lead. The signal attenuation in the X10 position is accurate to within 5% when the Probe is used with an oscilloscope with the proper input impedance (either 3.6 MΩ or 1 MΩ, depending upon the wiring of the Probe). Two types of connectors are supplied for the other end of the coaxial cable.

597-356-04

PARTS LIST

PART No.	PARTS Per Kit	DESCRIPTION	PRICE Each
2-52	1	9 MΩ, 1/2-watt, 1% precision resistor	.35
1-37	1	2.2 MΩ, 1/2-watt, 10% resistor (red-red-green-silver)	.10
1-99	1	240 kΩ, 1/2-watt, 5% resistor (red-yellow-yellow-gold)	.15
31-54	1	4-40 pF trimmer capacitor	.35
60-7	1	Slide switch	.20
70-10	1	Nylon sleeve for banana plug, black	.10
70-11	1	Nylon sleeve for banana plug, red	.10
73-4	1	3/16" rubber grommet	.10
85-1396	1	Circuit board	
250-355	4	#2 x 3/16" sheet metal screw	.05
250-4	2	4-40 x 3/8" screw	.05
259-7	2	Spade lug	.05
260-1	2	Alligator clip	.15
343-2	1	Shielded cable	.10/ft
344-59	1	Hookup wire	.05/ft
345-1	1	Flat braid	.10/ft
438-13	1	Banana plug (screw type)	.15
438-47	2	Banana plug	.15
459-2	1	Probe end, red	.15
459-3	1	Probe end, black	.10
476-12	1	Probe body	.55
477-3	1	Solderless phone tip	.15
	1	Instruction sheet (See Page 1 for part number.)	
		Solder (Additional 3' rolls of solder, #331-6, can be ordered for 15 cents each.)	

The above prices apply only on purchases from the Heath Company where shipment is to a U.S.A. destination. Add 10% (minimum 25 cents) to the price when ordering from a Heathkit Electronic Center to cover local sales tax, postage, and handling. Outside the U.S.A., parts and service are available from your local Heathkit source and will reflect additional transportation, taxes, duties, and rates of exchange.

STEP-BY-STEP ASSEMBLY

( ) Position the circuit board so the three holes for the switch are toward the left.

NOTE: If the Probe is to be used with an oscilloscope that has an input impedance of 3.6 megohms, such as the Heathkit Model IO-18, follow the steps on Figure 1. If the Probe is to be used with an oscilloscope that has an input impedance of 1 meghom, such as the Heathkit Model IO-14, follow the steps on Figure 2.

3.6 Megohm Impedance

Install the components and wires following the numbered steps. Solder the leads or lugs to the foil as the components and wires are installed. Then cut off the excess lead or lug lengths unless told otherwise

To prepare a wire, cut it to the indicated length and remove 1/4" of insulation from each end unless the step directs otherwise

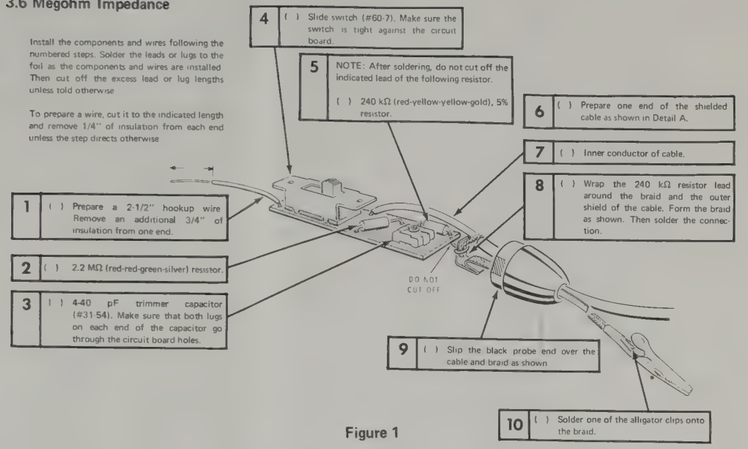
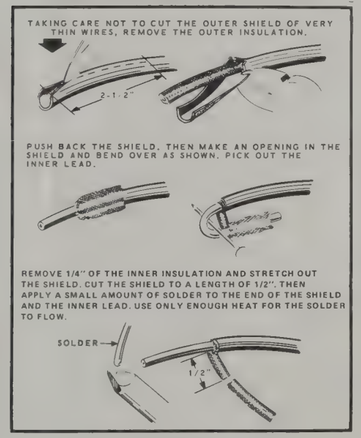


Figure 1

Proceed to the "Probe Body Assembly" section.



Detail A

1 Megohm Impedance

Install the components and wires following the numbered steps. Solder the leads or lugs to the foil as the components and wires are installed. Then cut off the excess lead or lug lengths unless told otherwise.

To prepare a wire, cut it to the indicated length and remove 1/4" of insulation from each end unless the step directs otherwise.

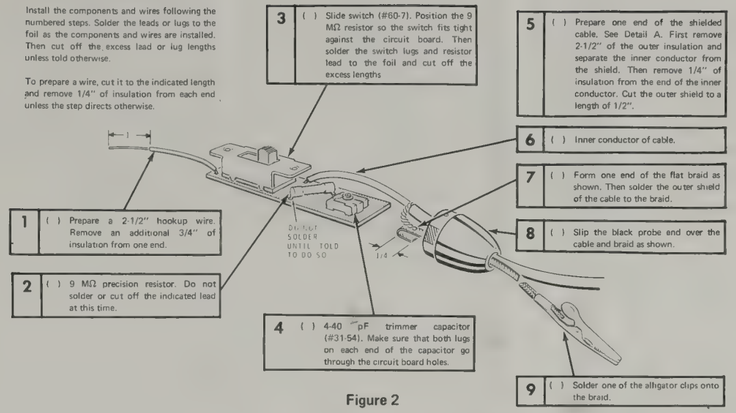
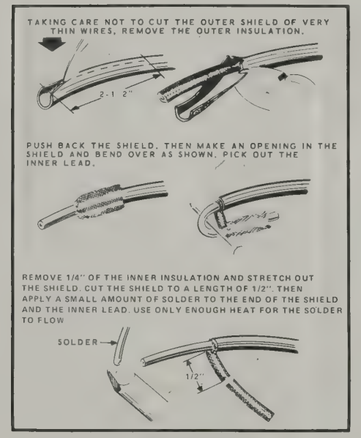


Figure 2

Proceed to the "Probe Body Assembly" section.



Detail A

Probe Body Assembly

( ) Now slip the completed switch-trimmer assembly into the probe body and secure the switch with two 4-40 x 3/8" screws.

( ) Secure the black probe end to the probe body with two #2 x 3/16" sheet metal screws. Be sure the ends of the shielded lead and flat braid are between the black probe end and the probe body to provide a ground connection for the probe body. The "flat spot" on the probe end will provide the necessary clearance. (Refer to Figures 1, 2, and 3.)

( ) Install the rubber grommet in the trimmer adjustment hole.

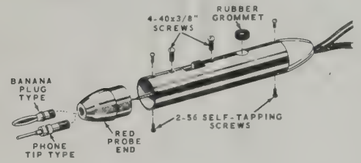


Figure 3

NOTE: Two different types of tips can be installed in the red probe end. Determine which type you wish to use and follow the appropriate step below.

Phone Tip Type

( ) Screw the phone tip securely into the red probe end. Remove the knurled collar and thread the bare lead protruding from the front of the probe through the hole in the center of the phone tip as you push the probe end into place. Secure with two #2 x 3/16" sheet metal screws. Wrap the bare lead clockwise around the tip. Then reinstall the knurled collar, and tighten to secure the lead.

Banana Plug Type

NOTE: There are two types of banana plugs supplied. Use the screw type in the next step.

( ) Screw the banana plug about halfway into the red probe end and, as you push the probe end into place, thread the bare lead protruding from the front of the probe through the hole in the center of the banana plug. Secure with two #2 x 3/16" sheet metal screws. Now wrap the lead clockwise around the base of the banana plug and tighten the plug, securing the lead between the banana plug base and the probe end.

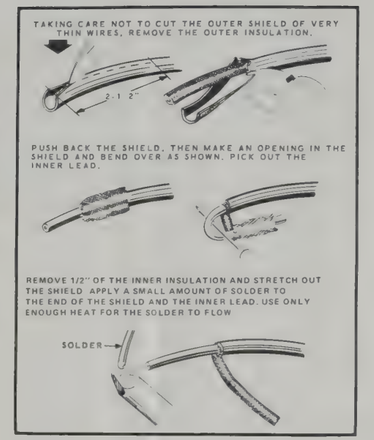


Figure 4

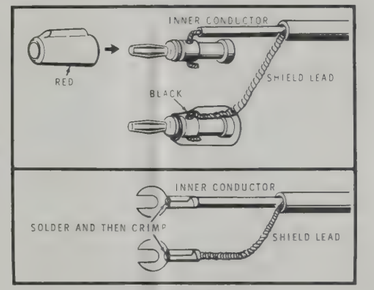


Figure 5

( ) Prepare the other end of the shielded cable as shown in Figure 4.

( ) Two types of output connectors have been supplied with your Probe. Determine which type will work best with your Oscilloscope. Then refer to Figure 5 and install either the banana plugs or spade lugs.

This completes the assembly of your Heathkit Universal Oscilloscope Probe.

CUSTOMER SERVICE

REPLACEMENT PARTS

If you need a replacement part, please fill in the Parts Order Form that is furnished and mail it to the Heath Company. Or, if you write a letter, include the:

- **Part number** and **description** as shown in the **Parts List.**
- Model number and Series number from the blue and white label.
- Date of purchase.
- Nature of the defect.

Please do not return parts to the factory unless they are requested. Parts that are damaged through carelessness or misuse by the kit builder will not be replaced without cost, and will not be considered in warranty.

Parts are also available at the Heathkit Electronic Centers listed in your catalog. Be sure to provide the Heath part number. Bring in the original part when you request a warranty replacement from a Heathkit Electronic Center.

NOTE: Replacement parts are maintained specifically to repair Heathkit products. Parts sales for other reasons will be declined.

TECHNICAL CONSULTATION

Need help with your Heathkit? . . . . Self Service? . . . . Construction? . . . . Operation? . . . Call or write for assistance. You'll find our Technical Consultants eager to help with just about any technical problem except "customizing" for unique applications.

The effectiveness of our consultation service depends on the information you furnish. Be sure to tell us:

- The Model number and Series number from the blue and white label.
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- Everything you have done in attempting to correct the problem.

Also include switch positions, connections to other units, operating procedures, voltage readings, and any other information you think might be helpful.

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Hints: Telephone traffic is lightest at midweek. . .please be sure your Manual and notes are on hand when you call.

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REPAIR SERVICE

Service facilities are available, if they are needed, to repair your completed kit. (Kits that have been modified, soldered with paste flux or acid core solder, cannot be accepted for repair.)

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- Your name and address.
- Date of purchase.
- Copies of all correspondence relevant to the service of the kit.
- A brief description of the difficulty.
- Authorization to return your kit C.O.D. for the service and shipping charges. (This will reduce the possibility of delay.)

Check the equipment to see that all screws and parts are secured. (Do not include any wooden cabinets or color television picture tubes, as these are easily damaged in shipment.) Place the equipment in a strong carton with at least THREE INCHES of *resilient* packing material (shredded paper, excelsior, etc.) on all sides. Use additional packing material where there are protrusions (control sticks, large knobs, etc.). If the unit weighs over 15 lbs., place this carton in another one with 3/4" of packing material between the two.

Seal the carton with reinforced gummed tape, tie it with a strong cord, and mark it "Fragile" on at least two sides. Remember, the carrier will not accept liability for shipping damage if the unit is insufficiently packed. Ship by prepaid express, United Parcel Service, or insured Parcel Post to:

Heath Company
Service Department
Benton Harbor, Michigan 49022

TEST AND CALIBRATION

Connect the Probe to your oscilloscope and slide the switch in the Probe to its normal position, toward the probe tip. This is the direct or unattenuated position. Connect the Probe to a source of 1 kHz square waves * and observe the pattern. Now switch to the X10 position and adjust the trimmer in the probe body for an identical wave shape; remember that the amplitude will be only one tenth of the original signal. Your Probe is now completed and may be put into service.

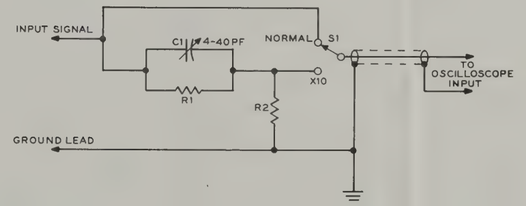
*If a suitable square wave signal is not available and you have a Heathkit Model IO-18 or similar oscilloscope, you may use the sawtooth voltage generated within your oscilloscope. (This is not possible, however, with the Heathkit Model IO-14 Oscilloscope.) An easy place to obtain this signal is from the horizontal deflection plate connections on the cathode ray tube socket. Adjust the oscilloscope's sweep frequency controls to produce a sweep of approximately 1000 Hz. With the horizontal and vertical gain controls properly adjusted, a diagonal line will result. With the Probe in the X10 position, carefully observe the ends of this diagonal line as you adjust the trimmer. The point which gives the straightest diagonal line is the proper setting.

CIRCUIT DESCRIPTION

A signal at the input of the Probe is applied directly to the input of the oscilloscope when switch S1 is in the Normal position. When S1 is in the X10 position, the signal at the junction of resistors R1 and R2 is applied to the input of the oscilloscope. When the Probe is wired for use with a 3.6 MΩ input oscilloscope, 9/10 of the signal is dropped across R1 and 1/10 of the signal is dropped across R2. When the Probe is wired for use with a 1 MΩ input oscilloscope, the input resistance of the oscilloscope is used in place of R2. Here, the value of R1 is selected so that 9/10 of the signal is dropped across it and 1/10 of the signal is dropped across the input resistance of the oscilloscope.

Capacitor C1 is one leg of a capacitive voltage divider; the capacitance of the coaxial cable and the oscilloscope input forms the other leg. When C1 is properly adjusted, 9/10 of the signal is across C1 and 1/10 is across the capacitance of the coaxial cable and the oscilloscope input.

SCHEMATIC OF THE HEATHKIT® UNIVERSAL OSCILLOSCOPE PROBE MODEL PK-1



NOTE:

NOTES: THE VALUE OF RESISTORS R1 AND R2 DEPEND ON DESIRED OUTPUT IMPEDANCE. SEE CHART BELOW:

3.6 MEGOHM	1 MEGOHM
R1 = 2.2 MΩ	R1 = 9 MΩ
R2 = 240 KΩ	R2 = NOT USED

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Heath Company
Service Department
Benton Harbor, Michigan 49022

HEATHKIT

Input Impedance . . . . .

Maximum DC Voltage . . .

The Heathkit Model PK-1 permits you to observe sig affected by the relatively l oscilloscope and its coax attenuation in the X10 pos

597-356-04

OWNER'S MANUAL

CORNELL-DUBILIER ELECTRONICS

MODEL AR-22R

AUTOMATIC ANTENNA ROTOR SYSTEM

GENERAL

Model AR-22R Antenna Rotor is designed to support and rotate the largest television ntennas. The rotor will support stacked arrays and deep ringe area antennas. AR-22R is **not** intended for large Ham beams. Large Ham beams may present a sufficiently igh wind resistance to rotate the antenna without being nergized. This will have the effect of changing the R-22R synchronization. For very windy areas or large eams, the CDE TR-44 or HAM-M rotors are recommend-d.

he AR-22R is rated to support a dead vertical weight of 50 pounds, has 500 inch pounds of motor stall torque nd resists an overturning moment of approximately 4000 nch pounds without guying. The control box will control within 6° accuracy. The rotor is lubricated for long fe and is suitable to approximately —15°F. The clicking ound when rotating is normal.

INSTALLATION

Prior to mounting the rotator on the mast, it is well to check the operation of both rotator nd control box wired for each of the 4 connections. TION — BEFORE OPERATING UNIT READ LABEL N BOTTOM OF CHASSIS. Model AR-22R operates from 15 VAC 60 cycle.

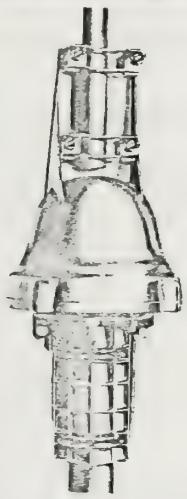
he rotator unit is shipped from the factory set at the nd of rotation in full "NORTH" counter-clockwise posi-on (looking down at top of rotor). The unit should be hecked using all the wire to be used in the installation. he wire should be according to the recommended wire zes.

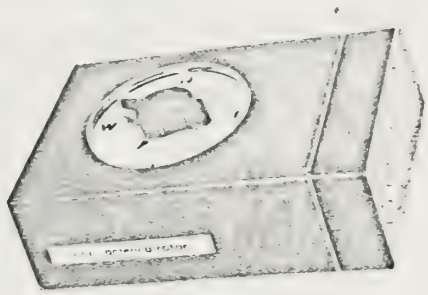
ote that the rotor mast clamps are reversible. Turning hem allows clamping to large diameter (up to 2") or mall diameter (down to 7/8") masts. The lower mast upport may be removed from the rotor base plate so hat the rotator without the lower mast support may be ounted in a tower.

tandard four-wire conductor cable is available at any ectronics supply houses. Be sure to use the recom-ended sizes (gauges).

he lower mast support casting is shipped unmounted; ed the cable through the rubber grommet in the ter-inal cover plate and strip each conductor end. Connect s shown in Figure 1. Then mount the lower mast support sting to the Rotor base with four hex head bolts and ck-washers, tighten them securely.

o relieve strain on the antenna lead-in cable, standoff sulators should be mounted on the mast as follows: i e Rotor in "end" position, mount a standoff insu-to directly above upper mast support and another im-ediately below lower mast support as shown. The stand-fs should be 180° apart. Dress antenna down-lead rough the standoffs, allowing sufficient slack for com-ete rotation. See Figure 2.





USE THE FOLLOWING WIRE SIZES:

Wire Gauge	Max. No. of Feet
22	100
20	150
18	220
16	350
14	550

GUYING

Two guy wire lugs are provided on the lower mast support casting for guying purposes. The use of standard 3/16" or 1/4" guy thimbles with adequate size wires, using turnbuckle adjustments, is recommended. Care should be taken not to tighten guy wires excessively. The installation should have a slight freedom of movement to prevent storm damage.

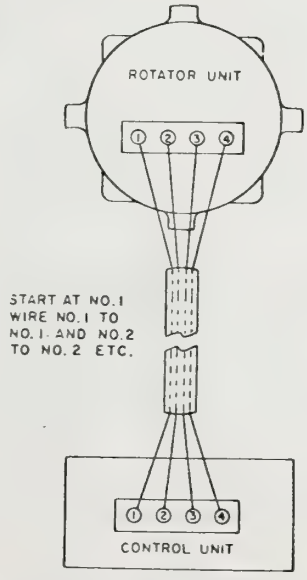


Fig. 1

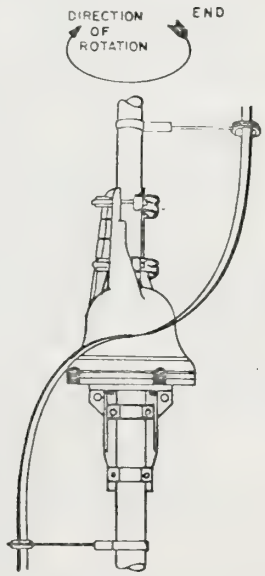


Fig. 2

The AR-22R control box is electrically identical to the previous model AR-22 and is fully interchangeable with previously manufactured AR-22 rotors.

CDE Rotor System AR-22R

SYNCHRONIZATION

1. Synchronize the Rotor unit with the control box unit in 2 steps as follows:

1. Turn the knob to the extreme **counter-clockwise** position — do not force. If the lights remain on after pulsing stops, trip the synchronization lever found on the bottom of chassis until they go out.

2. Now turn the knob to the extreme **clockwise** position. If the lights remain on after pulsing stops trip the lever until they go out. The units are now synchronized.

ELECTRICAL AND LIGHTNING PROTECTION

Radio and television equipment installation practices are covered by the National Electrical Code. Two pamphlets are published, one concerning the electrical code, the other lightning protection. The former, Pamphlet NFPA 70-1971, Article 810 (3.50) covers installation. The latter, Pamphlet NFPA 78-1968 ($1.25) covers lightning protection. Both pamphlets are published by and available from:

National Fire Protection Association
60 Batterymarch Street
Boston, Massachusetts 02110

Masts and metal parts should be permanently grounded using No. 10 copper or No. 8 aluminum building wire. Grounding wires should not make sharp bends and should run as straight as possible to the grounding stake or if possible to the nearest cold water pipe outside the building. Clamps should be permanent and secure. Do not bury aluminum wire in ground. Grounding stakes should be ¾" I.D. galvanized pipe or equivalent at least 18" away from house foundation. The ground rod should be driven as deeply as possible but not less than 4 feet.

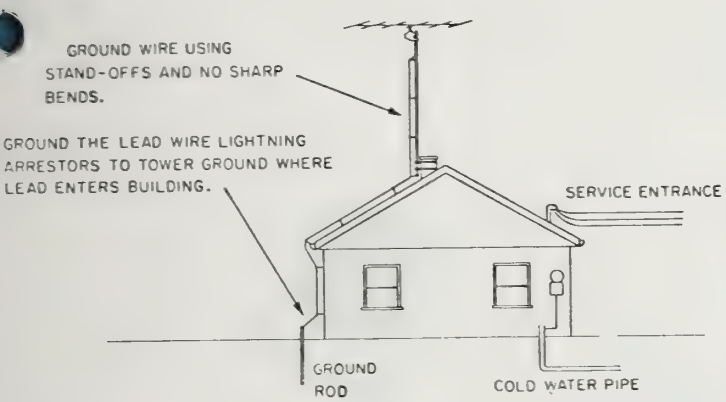


Fig. 3 — TYPICAL GROUNDING SYSTEM

UHF & COLOR RECEPTION

Special care must be exercised when installing UHF or color TV antenna lead-ins. It is recommended that shielded twin lead or coaxial lead in wire be used for UHF and color. Follow the manufacturers recommendations for matching the impedance of the lead-in wire to the TV set and to the antenna.

If ordinary 300 ohms TV lead-in wire is used for UHF or color, special care must be exercised to avoid grounding out the signal or changing the phase relation of the color signal. Avoid running the lead-in close to building or anything metal. Twist the lead-in to minimize ghosts. You may have to experiment to find the best installation method and location.

CIRCUIT

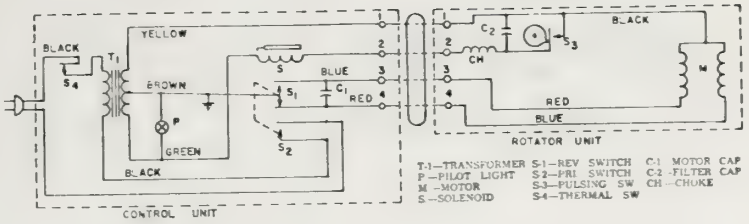


Fig. 4 — SCHEMATIC

OPERATION

Move the dial knob until the knob marking indicates the desired direction. The red pointer will now show the position of the antenna as it is moving. It is desirable to have the red pointer come to a stop before reversing direction.

When turning the knob thru an angle greater than 330° allow the unit to pulse a few times before completing the turn. Do not force the knob when the end of rotation is reached.

(A) IMPORTANT — IF LIGHTS REMAIN ON AFTER PULSING HAS STOPPED it indicates [with the exception noted in (B)] that the ROTOR and control box are not synchronized with each other and the motor is stalled. Do not allow this condiction to continue because the temperature of the motor is rising unnecessarily. Correct this condition by synchronizing per instructions under paragraph on "Synchronization", or on the underside of the control box.

(B) IMPORTANT — IF PULSING SOUND IS NOT EVIDENT WHEN YOU TURN THE KNOB, either to the right or left, it indicates that the thermoswitch has come into play. This protective device in the transformer automatically shuts off the power to the ROTOR unit when the rotator has been operated continuously for too long a period of time (usually 10 to 15 minutes) or when the ROTOR and control box have been allowed to remain out of synchronization with each other with the power on as mentioned above. To REMEDY, line the knob up with the red pointer, and allow the rotator to rest until the temperature drops. This will take about 5 minutes. The thermoswitch will then close and the rotator will again be operative.

Test for synchronization by following the instructions for synchronizing.

To replace dial light, type No. 47, in the control unit, remove the four cover screws and lift cover from chassis.

WARRANTY

CORNELL-DUBILIER ELECTRONICS warrants each new CORNELL-DUBILIER ROTOR to be free from defects in material arising from normal usage. Its obligation under this warranty is limited to replacing, or at its option repairing the rotor which, after regular installation and under normal usage and service, shall be returned within **ONE (1) YEAR** from date of original consumer purchase of the rotor to **Cornell-Dubilier Electronics, Rotor Service Dept., 118 E. Jones St., Fuquay-Varina, N. C. 27526**, together with satisfactory evidence of such purchase, and which shall be found to have been thus defective in accordance with the policies established by CORNELL-DUBILIER ELECTRONICS.

The obligation of CORNELL-DUBILIER ELECTRONICS does not include either the making or the furnishing of any labor in connection with the installation of such repaired or replacement rotor, nor does it include responsibility for any transportation expense.

CONDITIONS AND EXCLUSIONS

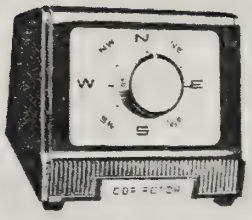
This warranty is expressly in lieu of all other agreements and warranties, expressed or implied, and CORNELL-DUBILIER ELECTRONICS does not authorize any person to assume for it the obligation contained in this warranty and neither assumes nor authorizes any representative or other person to assume for it any other liability in connection with such CORNELL-DUILIER Rotor.

The warranty herein extends only to the original consumer and is not assignable or transferable, and shall not apply to any rotor which has been subject to alteration, misuse, negligence or accident.

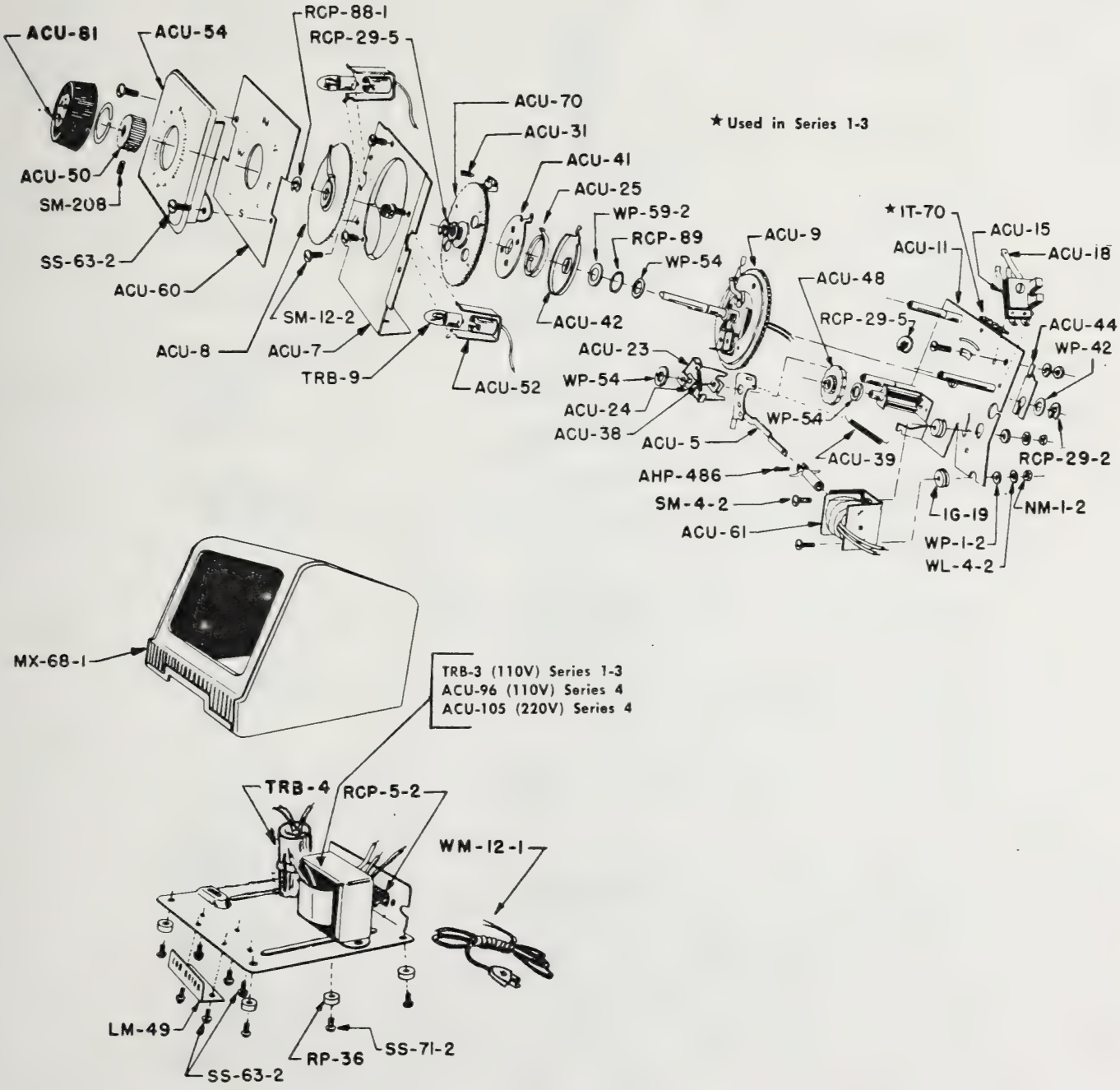
CORNELL-DUBILIER ELECTRONICS
118 E. Jones Street
Fuquay-Varina, N. C. 27526

NOTICE TO SERVICEMAN: Leave this instruction sheet with the Customer. It contains his operating instructions.

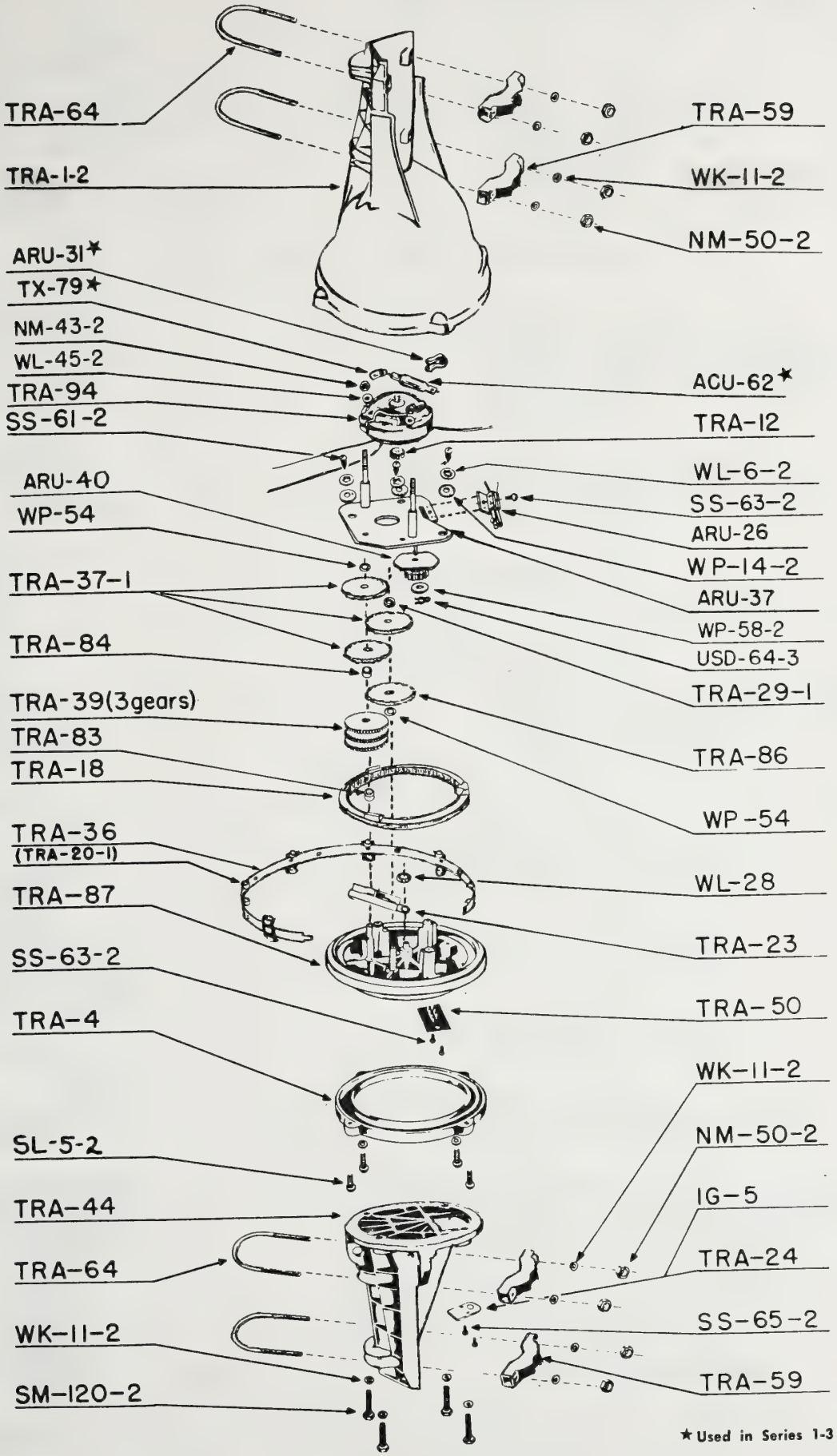
Parts and Service can be obtained through your local dealer, or by writing to Cornell-Dubilier Electronics, Rotor Parts Department, 118 E. Jones Street, Fuquay-Varina, North Carolina 27526.



MODELS
AR-22
AR-22-220
(Discontinued Item)



AR-22 Control Unit Exploded View



AR-22 Rotor Exploded View

50429-10 ROTATOR ASSEMBLY, COMPLETE $34.95
Includes LOWER MAST SUPPORT & HARDWARE

50425-10 **MOUNTING HARDWARE KIT** 3.60
Includes
- 4 U-BOLTS
- 8 NUTS & LOCKWASHERS
- 4 MAST CLAMPS
- 4 LOWER MAST SUPPORT SCREWS & HARDWARE

50304-10 **UPPER MAST SUPPORT** 6.10

50419-10 **MOTOR ASSEMBLY KIT** 11.25
Includes MOTOR & PINION, CHOKE COIL, PULSE SWITCH ASSEMBLY, TERMINAL BOARD ASSEMBLY, CAPACITOR, WIRING, SCREWS, MOTOR MOUNT NUTS & LOCKWASHERS

50420-10 **MOTOR MOUNT PLATE KIT** 1.80
Includes MOTOR MOUNT PLATE & STUDS, 3 MOUNTING SCREWS, WIRING WRAP LUG & WASHER

50421-10 **CAM GEAR KIT** .70
Includes CAM GEAR, WASHER & COTTER

50422-10 **SPUR GEAR KIT** 3.00
Includes
- 3 ASSEM'D GEARS (SHT. PINION) UPPER 3
- 1 ASSEM'D GEAR (LG. PINION) LOWER L.
- 3 STACKED SPUR GEARS (LOWER R.)
- 5 SPACERS & WASHERS

50313-10 **RING GEAR** 1.40

50427-10 **BEARING STRAP ASSEMBLY** 1.60
Includes 12 BALL BEARINGS

50370-10 **BASE INCLUDING POSTS** 4.25
(Does Not Include Stop Below)

50423-10 **STOP ARM KIT** .60
Includes STOP & SPRING WASHER

50424-10 **BEARING RACE KIT** 2.25
Includes RACE & 4 MOUNTING SCREWS

50349-10 **MAST SUPPORT KIT** 3.70
Includes LOWER MAST SUPPORT, INSPECTION PLATE & GROMMET, 2 MOUNTING SCREWS FOR INSPECTION PLATE

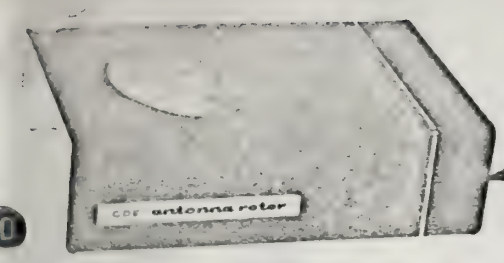
50428-10 **GREASE FOR ONE ASSEMBLY** .35

HDWE. INCLUDED IN 50425-10 KIT

AR-22R ROTATOR

ORDER PARTS USING COMPLETE NUMBER & DESCRIPTION

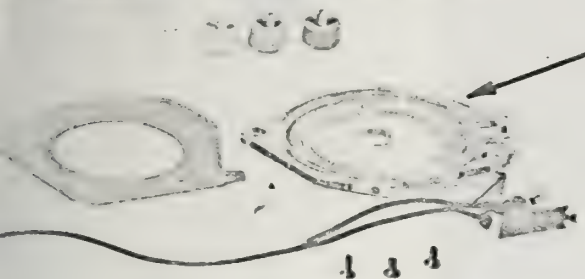
To order parts, remit check or money order for total parts cost plus $.50 for postage and handling to: Cornell-Dubilier Electronics, Department "C", 118 E. Jones Street, Fuquay-Varina, N. C. 27526



50065-10 CONTROL BOX ASSEMBLY COMPLETE $24.00

50580-10 **COVER KIT AR-22R/AR-10** 3.30

COVER & RECESS BUMPERS (4)



50581-10 **DIAL FACE KIT** 2.00

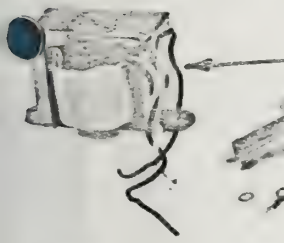
DIAL FACE, LIGHT SHIELD OVERLAY, METAL LIGHT SHIELD, LIGHT SOCKET, LIGHT BULB #47, SCREWS AND INDICATOR PLATE

50433-10 **GEAR SPRING & INS. DISC. ASSEMBLY** 4.20

GEAR SPRING AND INS. DISC. ASSEMBLY, VINYL SLEEVING, RET. RING, KNOB ASSEMBLY, LOST MOTION LEVER AND SPRING WASHER

50584-10 **SOLENOID & CONNECTING BAR KIT** 2.30

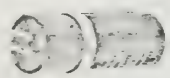
COIL ASS'Y, PAWL ARM & CONNECTING BAR ASS'Y, L.H. PAWL, R.H. PAWL, PAWL SPRING, RET. RING, LEVER SPRING, ESCAPE WHEEL, FLAT WASHER, SCREWS, HEX NUTS, & FLAT WASHERS



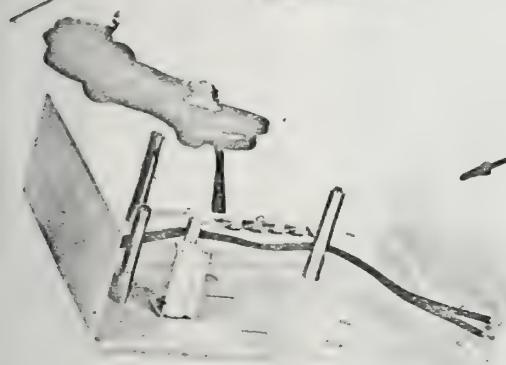
50436-10 **TRANSFORMER, AR-22R/AR-10** 5.50

50582-10 **INSULATOR BLOCK KIT** .60

INSULATOR BLOCK & CONTACTS, HEX NUT, SCREW, GROUND LUG, & LOCK WASHER



50040-10 **CAPACITOR, ELECTROLYTIC** 1.65



50586-10 **CHASSIS KIT AR-22R/AR-10** 3.70

CHASSIS KIT, BOTTOM COVER & SCREW

50647-10 **COMMON REPLACEMENT PARTS KIT** 1.10

RECESS BUMPERS (4), KNOB ASSEMBLY, LAMP, SPRING WASHER BOWED, PAWL SPRING, LEVER SPRING & RET. RING

AR-10/AR-20/AR-22R CONTROL BOX

ORDER PARTS USING COMPLETE NUMBER & DESCRIPTION

To order parts, remit check or money order for total parts cost plus $.50 for postage and handling to: Cornell-Dubilier Electronics, Department "C", 118 E. Jones Street, Fuquay-Varina, N. C. 27526

JCM MINIATURE COAXIAL CONNECTOR

CAT. NO. 142-0261-001
CLAMP TYPE PLUG
for flexible cables
RG-55, 58, 141, 142, 223/U

E. F. JOHNSON COMPANY
WASECA, MINNESOTA 56093
021-3327-003

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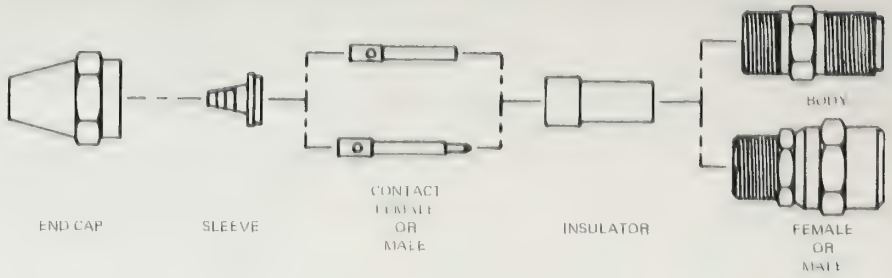
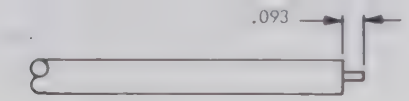
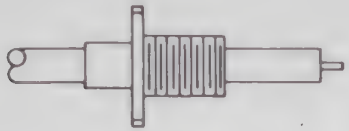
ASSEMBLY INSTRUCTIONS

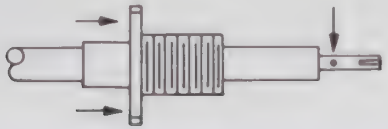




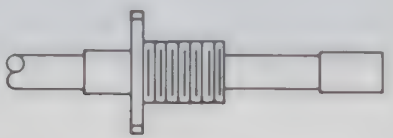
Cut cable shield and dielectric as shown. Be sure not to nick center conductor.



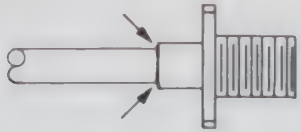
Slide body over cable as shown.



Solder contact to center conductor. Allow to cool and trim excess dielectric.



Slide insulator over contact and carefully slide body into place. Make sure center contact is flush with insulator.



Carefully solder body to coax.

Expand Your Horizons With A

DX 'J' ANTENNA

DX 'J' MOBILE MOUNTED

The DX 'J' antenna perfected by W6DXJ, is without a doubt, the finest antenna of its type.

Features:

Rugged construction, quality components and gold alodized aluminum radiators ensure peak efficiency under all operating conditions.

End-fed dipole design requires no ground plane, and thus readily adapts to the most stringent installation requirements, while maintaining peak operational efficiency.

Universal mounting block includes standard 3/8-24 threaded hole for mobile or base mount, 10-32 threaded holes for side mounting. Side holes also usable for H-T mounting.

Teflon coax matching section provides superior mechanical bond and optimum matching across the operating band. Typ VSWR 1.5:1 or less over the entire band. Power handling capability exceeds 250W continuous duty.

Weight is a mere 8 ounces, for true portability. Collapsible model for two meters packs into an overnite bag with ease.

All models complete with 15' coax and connectors. Special DX 'J' connectors are inexpensive JCM series by E. F. Johnson.

DX 'J' models available for the following amateur bands: 144-148, 144-148 collapsible, 220-225, 420-430, 430-440, 440-450 MHz.

Prices for all standard DX 'J' models including cable and connectors: $29.95.
Price for the 144-148 collapsible model $34.95.
Shipping for all models $3.00 Calif. residents add 6% sales tax.

Models for 130-174 & 450-470 MHz Land Mobile and 155 MHz Marine FM bands also available.

SCS **SPECIALTY COMMUNICATIONS SYSTEMS, INC.**

8160 Miramar Road • San Diego, Calif. 92126
Louis N. Anciaux • WB6NMT
(714) 271-6310

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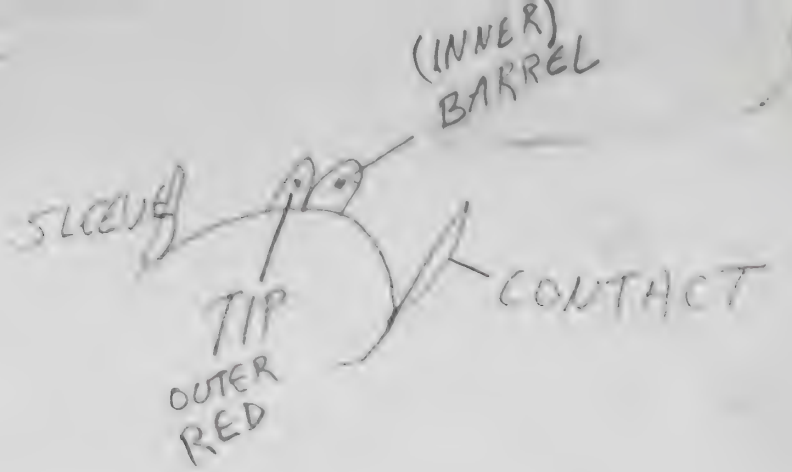
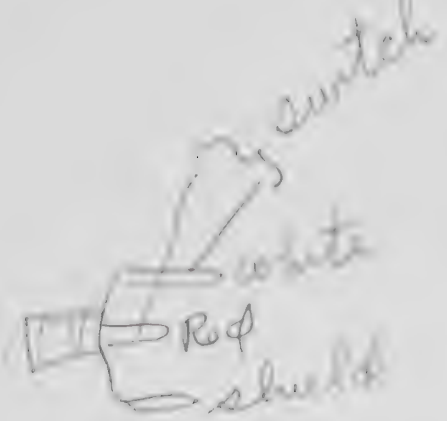
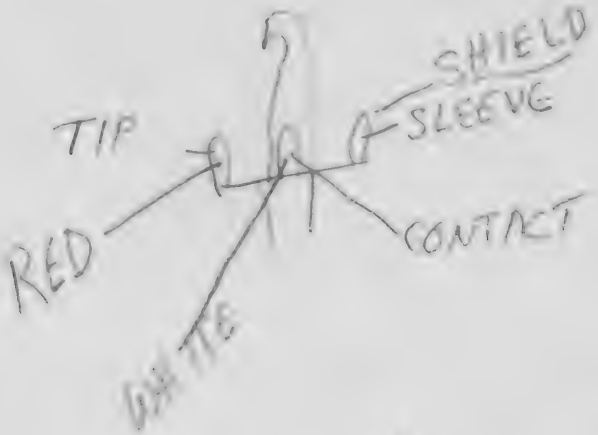
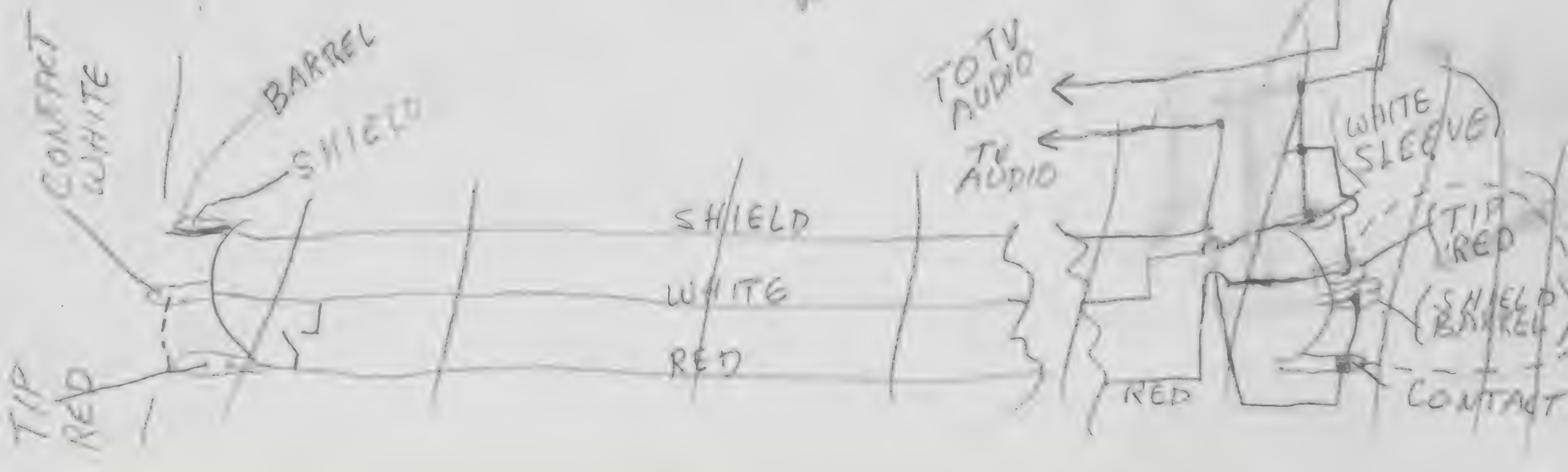

(INNER)
BARREL
SLEEVE
TIP
OUTER
RED
CONTACT


switch
white
Red
shield


TIP
SHIELD
SLEEVE
RED
CONTACT
WHITE


CONTACT
WHITE
BARREL
SHIELD
TIP
RED
SHIELD
WHITE
RED
TO TV
AUDIO
TV
AUDIO
WHITE
SLEEVE
TIP
RED
SHIELD
BARREL
RED
CONTACT

the ham notebook

the T coupler

Here's a handy little gadget for your shack or shop that I've found to be as useful as the zip top on a Bud.

If you've ever had a need for a convenient transmitter-to-counter coupler, low power dummy load, matching network for a signal generator, or a little device to help measure repeater desense, this might be just what the doctor ordered. Basically, it's a 50-ohm, 2-watt dummy load and capacitance coupler made from three standard uhf connectors: a barrel (PL-258), a tee (M-358), and a plug (PL-259).

Construction is simple. Insert a 50-ohm, 2-watt resistor into the back of a PL-259 (**fig. 1**). Solder and trim the pin end of the connector. Trim the resistor lead at the back end of the connector and fill with solder to prevent any rf leakage. This will serve as your conventional 2-watt dummy load. Not too tricky so far.

Now, modify the T connector as follows. Unscrew the pin from the center section T and replace it with a flat-head screw. Over the head of the screw, place two or three pieces of insulation mica or plastic. Insert another flat-head screw into one end of the barrel connector. Now screw all three connectors together and check continuity to ensure proper insulation.

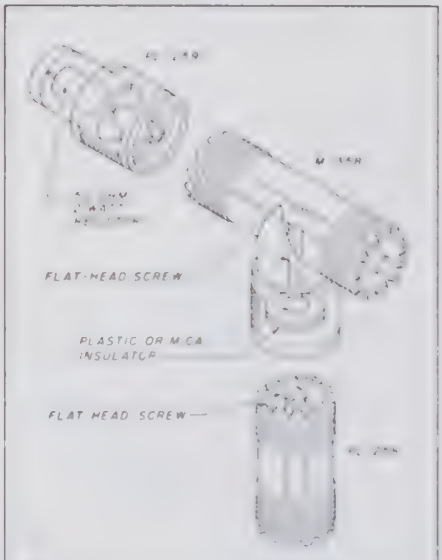


fig. 1. Construction of the T coupler using standard UHF connectors.

When tuning a low-power transmitter, a counter can now be coupled through the barrel. For higher-power transmitters, replace the 2-watt dummy load with a larger one.

With a receiver coupled to the 50-ohm match, a signal generator can be coupled by means of the barrel connector.

To check repeater desense, connect the duplexer output to a suitable dummy load through the T and connect a calibrated generator through the barrel connector. Measure the signal difference with the transmitter on and at idle.

Now that you've probably thought of at least 27 other uses for this little gem, there's no excuse for not adding it to your test bench.

John LaMartina, K3NXU

improved ground-mounted vertical for the lower bands

When using ground-mounted verticals a good ground system is essential for best results. In the case of a 1/4-wave or shorter vertical, the largest current in the ground system is near the base. Many radials will result in a small amount of power loss. However, it should be possible to improve on the average ground system by moving the high current portion of the ground into a metal conductor. A coaxial vertical antenna is the basis for this idea.

The upper 1/4 wave could be shortened by top loading. The lower 1/4-wave sleeve also could be cut to a more convenient length, with the feed line passing through the sleeve, as usual. The ground radials would be connected to the bottom of the sleeve at ground level.

Increasing the height above ground of the high-current portion, and allowing current to flow into a low-loss conductor out of the ground, should result in some degree of improvement. Of course, a full-size coaxial vertical would be nice — it wouldn't need any ground radials at all. Quite impressive, too, at 260 feet (79 meters) it would direct passing hams to your location from miles away.

E.R. Lamprecht, W5NPD

modification of Ham-M rotator control box

Early models of the popular Ham-M rotator have one very undesirable characteristic. When power is removed from the rotator motor, power is simultaneously removed from the

brake solenoid, causing the brake to slam into the rotator housing. This brings the moving antenna to an abrupt halt, thereby applying severe torsional strain to mast, rotator and tower.

I redesigned the switch in the control unit to change the make-break contacts so the antennas would come to a halt before the brake was applied. I had no way to manufacture a substitute switch, so I sent a drawing of the switch to the manufacturer and suggested the improvement. They said they were not interested! I had no intention of installing a torsion bar (per the manual) on my tower when there surely must be a better way.

Simple wiring changes in the control box of Series-3 units will provide independent brake control with no additional parts or switches and no drilling. My Ham-M is a Series 1, in which I modified the control unit to a Series 3 configuration per the simple instructions in the owner's manual, which came with the unit. Therefore, Series 1 and Series 2 units should be modified to Series 3 before the changes are made.

When the following changes have been made, moving the control lever slightly to right or left will cause the meter to indicate antenna position and will simultaneously release the brake. Moving the lever full right or left will start rotation. When the antenna has reached the desired heading, moving the lever back to first position will allow the antenna to come to a gentle stop. Returning the lever to center position then applies the brake.

I put a piece of masking tape just above the screw terminals on the back of the control box and marked them 1 Blk, 2 Red, 3 Blu, and so on. It is also a good idea to mark out the Series 1 on the control box back and change it to Series 3 for reference, if, indeed, you're modifying one of the earlier models.

One final note: In modifying my unit, I used parts of three schematics to come up with the desired result. I decided to write out the steps required and work from that, rather than pick off each step from a drawing. It worked beautifully for me and I'm sure it will for you.

mod steps

Viewing the control box switch from the top, contact 1 is the first contact on lower left; other contacts progress clockwise. Proceed as follows.

1. Remove eight wires from rear terminal strip. They will be returned to their original position when wiring is completed. Remove four rubber mounting feet. Lift off plastic cabinet. Remove four screws that hold meter assembly to base plate. Move meter assembly outward to provide access to control switch. It may be necessary to remove the power-transformer mounting screws to provide access to the inside of rear terminal strip. In the following wiring changes, when a connection is made, it should be soldered unless another wire is to be connected to that point later, in which case the instructions will say "do not solder."

2. Disconnect wire from SW contact 1. Leave it connected to 5 on rear terminal strip.

3. Remove jumper that is connected between SW contacts 4 and 8.

4. Remove from SW contact 4 the wire that goes to the primary of the *instrument* transformer.

5. Remove wire that connects SW contact 2 to 2 on rear terminal strip.

6. Remove wire from SW contact 3. Leave other end connected to 6 on rear terminal strip.

7. Reroute this wire from terminal 6 and solder to SW contact 8.

8. Remove the bottom wire from the primary winding of the *power* transformer.

9. Connect the wire just removed from the power transformer to 2 on the rear terminal strip. This now connects SW contact 6 to rear terminal strip 2.

10. Remove the wire from SW contact 4. (This is one lead of the primary of the *instrument* transformer.)

11. Connect the wire just removed to SW contact 2. Do not solder.

12. Connect a wire from the bottom terminal on the *power* transformer to SW contact 2. Solder two.

13. Install a jumper wire between SW contacts 1 and 3. Do not solder 3.

14. Remove wire that connects SW contact 7 to 3-amp fuse holder on instrument side of fuse.

15. Connect a wire from 3-amp fuse holder on instrument side of fuse to SW contact 3. Solder two.

16. Connect the wire attached to 5 on the rear terminal strip to SW contact 4. In this modification switch contacts 5 and 7 are not used.

This completes the wiring. It might be a good idea to check over the instructions before starting the modification, once the unit is removed from the cabinet. In this way it will become apparent as to just what's happening and why the brake operation will be independent of rotation.

After attaching the eight wires to the rear terminal strip, check out, with 120-Vac connected, should read approximately 30 Vac across terminals 1 and 2 when the switch is operated in either direction. A reading of 31 Vdc across terminals 3 and 7 with the switch operated is normal.

I modified my rotor control about three years ago and it has certainly been a source of pleasure to know that my tower, beams, and rotator are no longer subjected to the severe (and totally unnecessary) torsional forces.

William G. Blankenship, Jr., K4DLA/W1RDR

List of vintage tubes

	01A-	1	6D6-	1	6H6- 8
	2A6-	1	35Z5-	1	6V6- 2
	2A3-	3	807-	2	6F6- 3
	2A5-	8	6L6-	5	6N7- 4
	210-	2	6F6-	1	6SK7- 5
(10)-	VT25-	2	6Y6-	1	6L7- 2
	24A-	16	5V4-	1	6R7- 1
	27-	12	6K7	2	6K8- 1
	47-	3	6B8-	2	6B8- 1
	42-	2	6H6	3	6SA7- 1
	45-	2	6Q7-	1	6SR7- 2
	46-	2	6K6-	4	6SJ7- 3
	55-	3	6SN7-	5	6AC7- 1
	56-	2	12SN7-	1	6C5- 1
	57-	9	6SL7	2	117Z6- 1
	59-	2	6SC7-	1	Amperite 6-11 1
	39/44	1	6Q7-	2	6X5- 1
	58-	7	1D8-	1	6SG7- 2
	56-	11	1T5-	1	6K6- 2
	76-	7	6SJ7-	1	
	80-	4	12J5-	1	
	83V-	1	35L6-	1	
	5Z3-	5	117N7-	1	
	6Z4-	1	VR105-	5	
	6E5-	2	2E26*	1	
	78-	1	1LE3-	1	
	6A7-	1	7F8-	1	
	6A6-	1	6K7-	7	

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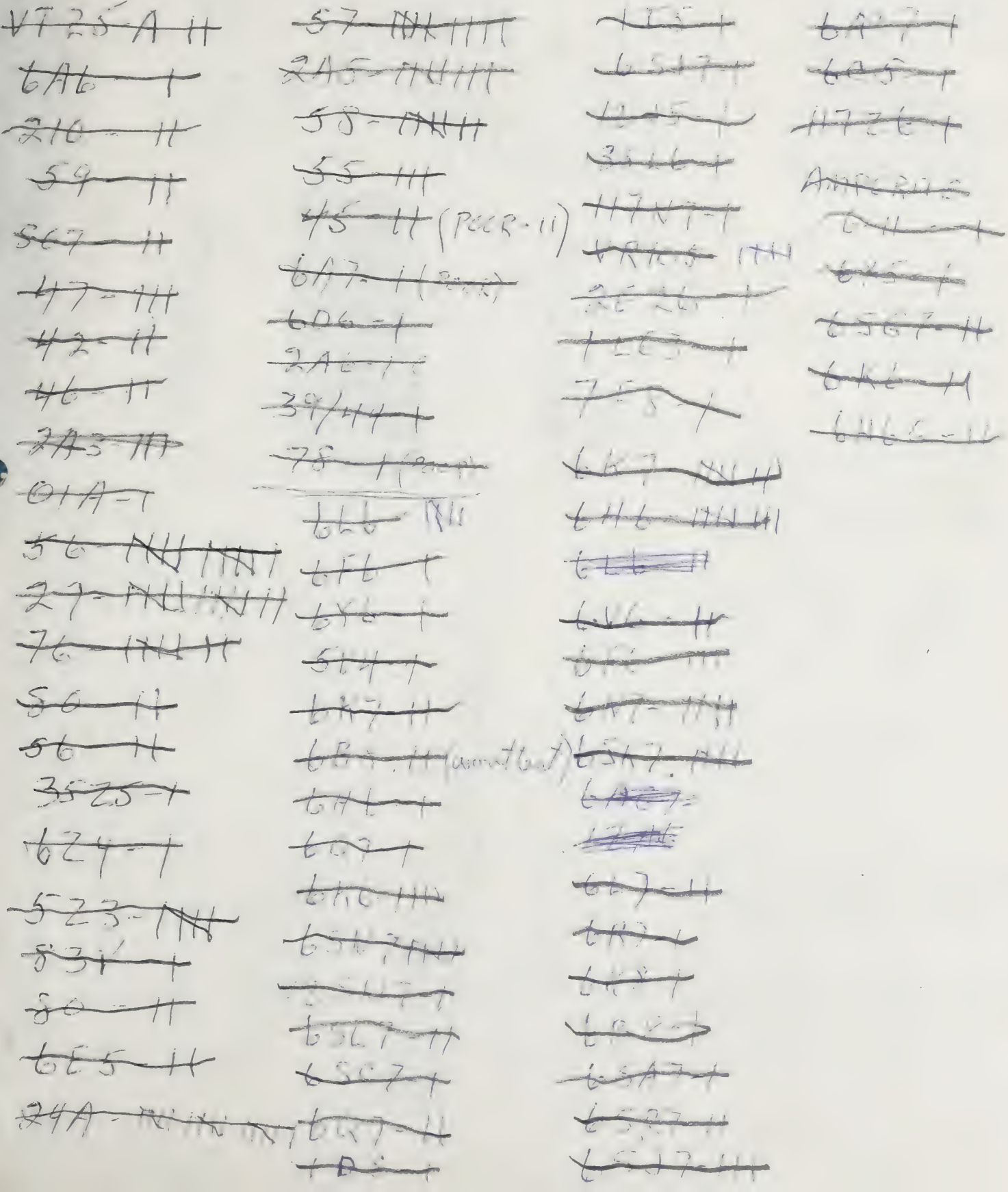


LIMITED WARRANTY

Your Spartus Electronic alarm clock is in warranty for one year from date of purchase against defects in material and/or workmanship. Tampering or attempted adjustments are not within the limits of this warranty.

This warranty gives you specific legal rights and you may also have other rights which vary from state to state

If this clock requires adjustments or repairs, return the clock to the factory. Pack it securely and insure it. Spartus will not accept collect shipments. Enclose Check or Money Order for $5.00 to cover the cost of handling.
Send to: **SPARTUS CORPORATION**
Dept. L.E.D., P.O. Box 187
Louisville, Mississippi 39339

CANADIAN RESIDENTS:

Send to the depot listed below. Do NOT send your clock across the border for service. It cannot be returned to you. Send clock to address below with check or money order for $5.00 to cover cost of handling.

F.E.W. Ltd.
333 DENISON STREET
UNIT 17
MARHAM, ONTARIO, CANADA L3R 2Z4

Printed in Hong Kong

LUNAR

INSTRUCTIONS

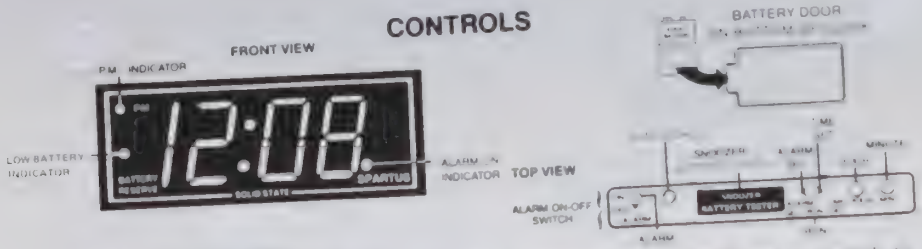
SPARTUS
Subsidiary of Kidde, Inc
KIDDE

Congratulations! You now own a **SPARTUS** Electronic Alarm Clock. It represents the latest in modern timekeeping. The 100% solid state mechanism has no moving parts (other than switches). The operation is accurate and completely silent.

FEATURES:

- Giant 1.8" L.E.D. Display
- Battery Reserve with low battery indicator (In Case of Power Failure)
- Easy-to-read L.E.D. (Light Emitting Diode) Display
- Hours and Minutes Display
- PM Indicator
- 24-Hour Alarm Setting
- "Alarm On" Indicator
- Snoozer
- Electronic Tone Alarm
- Lighted Colon
- Convenient Time and Alarm Setting Controls
- Bright/Dim Control
- Time Recall

CONTROLS



1. TO SET THE TIME:

Plug in your new **Spartus** alarm clock. The display will flash. Slide the set switch to **TIME SET** position. Depress and hold the **HOUR** button until you reach the correct hour and then release it. Then depress the **MIN** button until you reach the correct minute and then release it. You have now set the time. Slide the **SET** switch back to **RUN** and the clock will keep time. **NOTE**: A red dot will appear in the upper left hand corner of the display during P.M. hours. Be sure to set the time for the correct 12 hour period—A.M. (Morning) or P.M. (Evening).

2. TO SET THE ALARM TIME:

Slide the **SET** switch to **ALARM SET** position. Depress the **HOUR** button until you reach the desired hour and then release it. Then depress the **MIN** button until you reach the desired minute and then release it. You have now set the alarm time. The display will now show the time when the alarm is set to sound. Slide the **SET** switch back to **RUN** and the display will again show the correct time of day. **NOTE**: The P.M. indicator also applies to the alarm. Be sure to set your alarm time for the correct 12 hour period—A.M. (Morning) or P.M. (Evening). To recheck alarm time setting, slide the **SET** switch to **ALARM SET** position. The display will show the time the alarm is set to sound. Always slide the switch back to **RUN** position for normal operation.

3. TO TURN THE ALARM ON:

Slide the **ALARM** switch to "**ON**" position. A red dot will appear in the lower right hand corner of the display. When the alarm sounds, you can turn it off by sliding the **ALARM** switch to "**OFF**" position, or for a few extra minutes of sleep, press the **SNOOZER** button. The alarm will stop and will sound again in 9 minutes. You can continue to use **SNOOZER** repeatedly and the alarm will sound 9 minutes after each time the **SNOOZER** is pressed. If the alarm is not turned off it will sound continuously for two hours, then reset automatically for the next day. **NOTE**: This is a 24-hour alarm. You can set the alarm again immediately for the following day. Slide the **ALARM** switch to "**OFF**" position to turn the alarm off, and then slide the alarm switch to **ON** position. Your alarm will be set for the same wake-up time on the next day.

4. DIMMER CONTROL:

If you find the display too bright at night, slide the switch on the back of the clock into "**DIM**" position. Slide switch back for a brighter display during the day.

5. BATTERY RESERVE:

Your clock has a battery back up feature in case of power failure. A 9 volt battery (not included) is required. You must put in a battery (as illustrated) to ensure the battery back up feature is ready in case of power failure. If power fails, the back up battery will automatically continue operation of the clock and maintain actual time and alarm time. However, the display will not be lighted. When electrical power is restored, the display will light up again. The battery will maintain time keeping for approximately 30 hours during power failure or interruption. **NOTE**: Remove the battery if the clock is to be unplugged for a long time to avoid unnecessary battery drain. During a power failure, when the clock is under battery power, the clock may lose or gain up to two minutes per hour. This may require resetting of time for precise timekeeping.

6. LOW BATTERY INDICATOR

In order to maintain time keeping during power failure, A 9 volt battery must be inserted into the battery compartment. A red light in the lower left corner of the display indicates the condition of the battery:

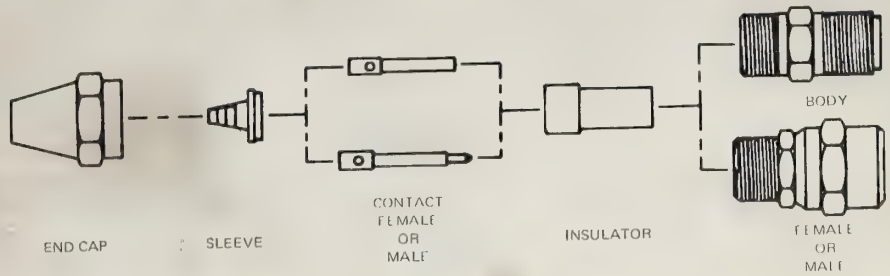
BATTERY CONDITION	INDICATION	ACTION
FRESH BATTERY	NO LIGHT	BATTERY IS OK
LOW BATTERY	STEADY LIGHT	BATTERY CAN NO LONGER MAINTAIN TIME. REPLACE IMMEDIATELY.
NO BATTERY	STEADY LIGHT	INSERT BATTERY FOR BATTERY RESERVE FEATURE.

The Snoozer Bar is also your battery tester. Depress Snoozer and check the battery condition according to the chart above. The indicator will light even if Snoozer is not depressed if battery is low. The best test is by checking with the Snoozer.

7. TIME RECALL

During Power Failure, time keeping is maintained by the backup battery, but the display is blanked out. To read time, depress time recall button momentary. Caution: prolonged use of time recall will reduce battery life.

ASSEMBLY INSTRUCTIONS



JCM MINIATURE COAXIAL CONNECTOR

CAT. NO. 142-0261-001
CLAMP TYPE PLUG
for flexible cables
RG-55, 58, 141, 142, 223/U

E. F. JOHNSON COMPANY
WASECA, MINNESOTA 56093
021-3327-003

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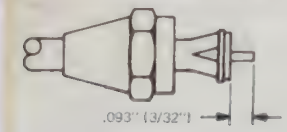
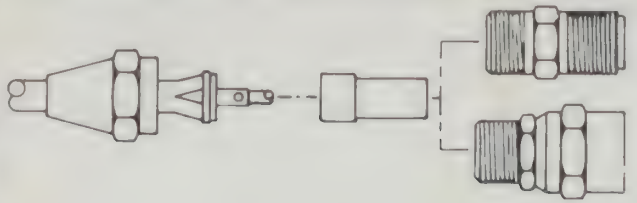
Place end cap over cable and remov 1 jacket 0.250" (1/4"). Cut two slit apart and 0.125" (1/8") long in the jacket to facilitate assembly

Spread out braid wires and trim center conductor insulator back as shown Make sure no braid wires are touching the center conductor



[illegible] center conductor to dimen

Solder [illegible] in position as shown



Slip insulator over contact and insert assembly into back of body. Bring end cap up to body and tighten (to torque of 6 8 in. lbs)

Introduction -

This Cushcraft AMS147 or ATS147 Mobile Antenna offers years of electrical and mechanical performance you can depend upon. We ask that you take the time to thoroughly read these instructions before proceeding.

Specifications

When properly installed, your antenna will meet or exceed these specifications.

Frequency Range	144-174 MHz
Gain	3dBi
Nominal Impedance	50 ohms
VSWR	less than 1.5 to 1
Power Handling	200 Watts
Weight	1.75 Lbs
Termination	PL259
Magnet Strength	(AMS-147)Nominal 90 lbs pull

Parts List

Notify the factory immediately if there are missing parts.

	AMS-147	ATS-147
48" Stainless Steel Whip	1	1
Base Coil Assembly	1	1
Magmount with Coax PL 259	1	-
Trunk Mount with Coax	-	1
PL259 Coax Connector	-	1
Allen Wrench	-	1

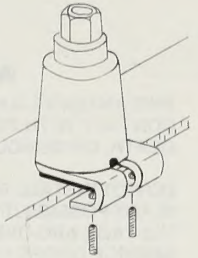
Assembly

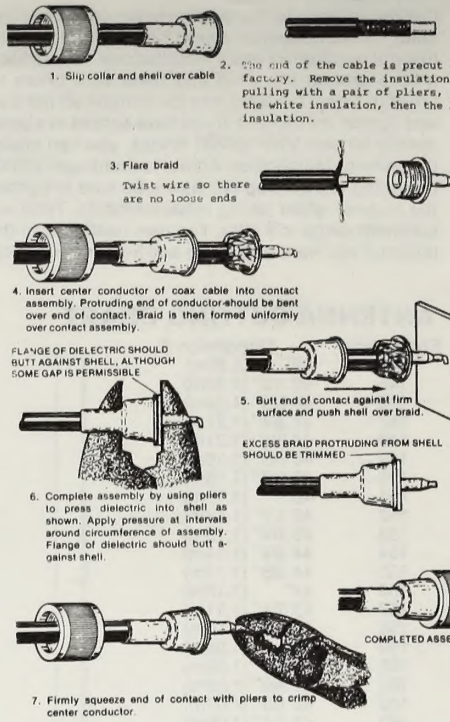
Your Cushcraft mobile antenna will perform as specified if the antenna is installed and tuned by carefully following the instructions.

MAGNET MOUNT: Screw the antenna base into the nylon insulator on the mount. Thread it carefully to avoid damaging the threads. When removing the antenna from the vehicle, remove the complete assembly including the magnet mount. Do not drag it across the roof. Dragging the mount will damage the underside of the base or scratch the vehicle surface.

For the best radiation pattern the magnet should be mounted on the center of the vehicle's steel roof, which will form the ground plane surface. Be sure that the surface is clean before mounting. The antenna can be mounted on the vehicle trunk, but it may not have an omnidirectional pattern.

TRUNK LIP MOUNT: Slide the mount over the forward edge of the trunk, figure 1. Scrape the paint on the inside of the lid under the Allen screw points, to give a good ground for the antenna.Tighten the Allen screws securely. The foam pad on the mount will protect the car's finish. If the fit between the trunk lid and car body is too tight, the gap can be widened slightly by loosening the nuts which attach the hinges to the trunk lid. The lid can than be moved back to give more space for the mount. Screw the antenna into the threaded brass socket on the mount. When removing the antenna for security or car washing, DO NOT REMOVE the brass socket.





The magnetic mount has a factory assembled PL-259 fitting for direct connection to your transceiver. The trunk lip mount has a field applicable connector, making it easier to run the cable through the vehicle. The connector should then be assembled by following the instructions shown in the diagram above.

Tuning:

Cut the antenna to the length shown on the cutting chart for the frequency you will be using. Note: cutting not required for many installations. To cut, file a groove around the whip and bend with pliers to break it. Insert the whip into the spindle all the way and tighten the locknut. If you have access to a good quality 50 ohm VHF VSWR Bridge, you can check the antenna installation. Adjust for minimum VSWR by sliding the whip up and down. Be sure to tighten the locknut when taking measurements. Total adjustment range in 3 MHz. You may need to trim the length if you want to operate at a higher frequency.

ANTENNA CUTTING CHART

Frequency	Dimension A
144	49" (1.26m)
145	48 1/2" (1.23m)
146	48 5/8" (1.24m)
147	47 3/4" (1.21m)
148	47 3/4" (1.21m)
149	46 7/8" (1.19m)
150	46 1/2" (1.18m)
151	46" (1.17m)
152	45 1/2" (1.16m)
153	45 1/4" (1.15m)
154	44 3/4" (1.14m)
155	44 3/8" (1.13m)
156	44" (1.12m)
157	43 3/4" (1.11m)
158	43 3/8" (1.10m)
159	43" (1.09m)
160	42 5/8" (1.08m)
161	42 3/8" (1.08m)
162	42 1/8" (1.07m)
163	41 3/4" (1.06m)
164	41 1/2" (1.05m)
165	41 1/4" (1.05m)
166	41" (1.04m)
167	40 5/8" (1.03m)
168	40 3/8" (1.03m)
169	40" (1.02m)
170	39 1/2" (1.00m)
171	39 1/4" (.99m)
172	38 7/8" (.99m)
173	38 1/2" (.99m)
174	38 1/8" (.97m)

"LIMITED WARRANTY"

CUSHCRAFT CORPORATION, P.O. BOX [illegible] CHESTER, NEW HAMPSHIRE 03108 WARRA[illegible] ORIGINAL CONSUMER PURCHASER FOR [illegible] FROM DATE OF PURCHASE THAT EACH [illegible] ANTENNA IS FREE OF DEFECTS IN MA[illegible] WORKMANSHIP. IF, THE JUDGMENT OF CU[illegible] ANY SUCH ANTENNA IS DEFECTIVE, THEN CU[illegible] CORPORATION WILL, AT ITS OPTION, RE[illegible] REPLACE THE ANTENNA AT ITS EXPENSE WI[illegible] TY DAYS OF THE DATE THE ANTENNA IS RETURN[illegible] PURCHASER'S EXPENSE) TO CUSHCRAFT OR [illegible] ITS AUTHORIZED REPRESENTATIVES. THIS WA[illegible] IS IN LIEU OF ALL OTHER EXPRESSED WA[illegible] ANY IMPLIED WARRANTY IS LIMITED IN DU[illegible] ONE YEAR. CUSHCRAFT CORPORATION SHA[illegible] LIABLE FOR ANY INCIDENTAL OR CONSE[illegible] DAMAGES WHICH MAY RESULT FROM A DEFE[illegible]. SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS OR EXCLUSIONS OR LIMITATIONS OF INCIDENTAL OR CONSEQUENTIAL DAMAGES, SO THE ABOVE LIMITATION AND EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE. THIS WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN SUBJECT TO MISUSE, NEGLECT, ACCIDENT OR IMPROPER INSTALLATION. ANY REPAIRS OR ALTERATIONS OUTSIDE OF THE CUSHCRAFT FACTORY WILL NULLIFY THIS WARRANTY.

WARNING

THIS ANTENNA IS AN ELECTRICAL CONDUCTOR. CONTACT WITH POWER LINES CAN RESULT IN DEATH, OR SERIOUS INJURY.

DO NOT INSTALL THIS ANTENNA WHERE THERE IS ANY POSSIBILITY OF CONTACT WITH OR HIGH VOLTAGE ARC-OVER FROM POWER CABLES OR SERVICE DROPS TO BUILDINGS.

CONSULT THE NATIONAL ELECTRICAL CODE FOR FURTHER DETAILS.

AMS-147

VHF

144-174 MHz

Magnetic Mount Mobile Antenna

3dB Gain

90 Lb Pull Magnet

cushcraft CORPORATION

varian

CAUTION — KEEP THIS SHEET WITH TUBE UNTIL INSTALLED IN EQUIPMENT

OPERATING HAZARDS

READ THIS SHEET AND TAKE ALL SAFETY PRECAUTIONS

PROPER USE AND SAFE OPERATING PRACTICES WITH RESPECT TO POWER TUBES ARE THE RESPONSIBILITY OF EQUIPMENT MANUFACTURERS WHO INCORPORATE THE TUBE INTO EQUIPMENT AND USERS OF SUCH TUBES AND EQUIPMENT. THE SUPPLIER OF THIS POWER TUBE PROVIDES INFORMATION ON ITS PRODUCTS AND ASSOCIATED HAZARDS, BUT IT ASSUMES NO RESPONSIBILITY FOR AFTER-SALE OPERATING AND SAFETY PRACTICES. LIMITED LIFE AND RANDOM FAILURES ARE INHERENT CHARACTERISTICS OF ELECTRON TUBES. TAKE APPROPRIATE ACTION THROUGH REDUNDANCY OR OTHER SAFEGUARDS TO PROTECT PERSONNEL AND PROPERTY FROM TUBE FAILURE.

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES OR EQUIPMENT WHICH UTILIZES SUCH TUBES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. DO NOT BE CARELESS AROUND SUCH PRODUCTS.

OPERATING INSTRUCTIONS

This Operating Hazards Sheet, any packing and unpacking instructions, installation instructions, operating instructions, and relevant test data which may be included with this Power Tube can help you to operate this tube safely and efficiently. READ THEM. The Technical Data Sheet for this power tube provides operating specifications for individual products and other application information. Uninformed or careless operation of this tube can result in poor performance, damage to the tube or property, serious bodily injury, and possibly death.

Questions regarding tube operation or safety matters should be addressed to the Applications Engineering Department.

WARNING—SERIOUS HAZARDS EXIST IN THE OPERATION OF POWER TUBES

The operation of power tubes involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel:

a. HIGH VOLTAGE—Normal operating voltages can be deadly. See below for additional information.
b. RF RADIATION—Exposure to RF radiation may cause serious bodily injury possibly resulting in blindness or death. **Cardiac pacemakers may be affected.** See below for additional information.
c. X-RAY RADIATION—High voltage tubes can produce dangerous, possibly fatal X-rays. See below for additional information.
d. BERYLLIUM-OXIDE POISONING—Dust or fumes from BeO ceramics used as thermal links with some conduction cooled power tubes are highly toxic and can cause serious injury or death. See below for additional information.
e. GLASS EXPLOSION—Many electron tubes have glass envelopes. Breaking the glass can cause an implosion, which will result in an explosive scattering of glass particles. Handle glass tubes carefully. See below for additional information.
f. HOT WATER—Water used to cool tubes reaches scalding temperatures. Touching or rupture of the cooling system can cause serious burns. See below for additional information.
g. HOT SURFACES—Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. See below for additional information.

Additional specific information about power tube hazards:

HIGH VOLTAGE

Many power tubes operate at voltages high enough to kill through electrical shock. Design equipment utilizing these tubes to prevent personnel contact with high voltages. Securely attach prominent hazard warnings. Personnel should always break the primary circuits of the power supply and discharge high voltage capacitors when direct access to the tube is required.

RADIO FREQUENCY RADIATION

EXPOSURE OF PERSONNEL TO RF RADIATION SHOULD BE MINIMIZED. PERSONNEL SHOULD NOT BE PERMITTED IN THE VICINITY OF OPEN ENERGIZED RF GENERATING CIRCUITS, OR RF TRANSMISSION SYSTEMS (WAVEGUIDES, CABLES, CONNECTORS, ETC.), OR ENERGIZED ANTENNAS. It is generally accepted that exposure to "high levels" of rf radiation can result in severe bodily injury including blindness. **Cardiac pacemakers may be affected.**

The effect of prolonged exposure to "low level" rf radiation continues to be a subject of investigation and controversy. While there continues to be support for lower limits, it is generally agreed among official standard-setting groups in the U.S. that prolonged exposure of personnel to rf radiation at frequencies of 10 MHz-100 GHz should be limited to average power densities of ten milliwatts per square centimeter (10 mW/cm^2) or lower, using any possible one tenth of an hour (.1 hour) as the averaging period. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. The 10 mW/cm^2 average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard or protection guide for employee work places.

Rf energy must be contained properly by shielding and transmission lines. ALL INPUT AND OUTPUT RF CONNECTIONS, SUCH AS CABLES, FLANGES AND GASKETS MUST BE RF LEAKPROOF. NEVER OPERATE A POWER TUBE WITHOUT A PROPERLY MATCHED RF ENERGY ABSORBING LOAD ATTACHED. NEVER LOOK INTO OR EXPOSE ANY PART OF THE BODY TO AN ANTENNA OR OPEN RF GENERATING TUBE OR CIRCUIT OR RF TRANSMISSION SYSTEM WHILE IT IS ENERGIZED. MONITOR THE TUBE AND RF SYSTEM FOR RF RADIATION LEAKAGE AT REGULAR INTERVALS AND AFTER SERVICING.

X-RAY RADIATION

As operating voltages increase beyond 15 kilovolts, power tubes are capable of producing progressively more dangerous X-ray radiation. Dangerous X-ray radiation is more likely from high-power transmitting tubes, many pulse-modulator tubes, high-vacuum rectifier tubes, and all older high voltage tubes that may have undergone changes in emission characteristics with aging and gradual deterioration. Provide adequate X-ray shielding on all sides of these tubes, particularly around the anode as well as the modulator and pulse transformer where these are used. Check X-ray levels. NEVER OPERATE HIGH VOLTAGE TUBES WITHOUT ADEQUATE X-RAY SHIELDING IN PLACE. MONITOR THE TUBE AFTER SERVICING AND AT REGULAR INTERVALS FOR POSSIBLE CHANGES IN X-RAY LEVELS DUE TO AGING.

DANGER:
BERYLLIUM OXIDE CERAMICS (BeO) - AVOID BREATHING DUST OR FUMES

BeO ceramic material is used as a thermal link to carry heat from the tube to a heat sink in a number of conduction cooled power tubes. The BeO thermal link may be brazed to the anode section of the power tube, or may be a separate accessory. Do not perform any operation on any BeO ceramic which might produce dust or fumes, such as grinding, grit blasting, and acid cleaning. BERYLLIUM OXIDE DUST OR FUMES ARE HIGHLY TOXIC AND BREATHING THEM CAN RESULT IN SERIOUS PERSONAL INJURY OR DEATH. Because BeO warning labels may become obliterated or removed, you are urged to contact your tube supplier before performing any work which might affect any external thermal link on any conduction-cooled power tube.

When BeO ceramics are to be salvaged or disposed of, special precautions must be taken to protect personnel. All such personnel must be made aware of the deadly hazards involved and the necessity of great care and attention to safety precautions. Any tube with a BeO thermal link, or any separate BeO thermal link will be disposed of without charge, provided it is returned freight prepaid to the supplier from which it was purchased with a written request for disposal. The supplier will then return it to the manufacturer for proper disposal.

GLASS EXPLOSION

Every power tube is pumped to a very high vacuum, which, in some cases, is contained by a glass envelope. When handling glass tubes, remember that glass is a relatively fragile material, and accidental breakage can result at any time. Breakage can cause an implosion, which will result in an explosive scattering of flying glass particles and fragments. Serious personal injury can result. The larger the tube envelope, the greater the potential hazard. When handling such tubes, safety glasses (or even better, a face shield), heavy clothing and leather gloves should be worn for protection.

HOT WATER

EXTREME HEAT occurs in the anode portion of power tubes during operation. Water channels used for cooling also reach high temperatures (as high as boiling, 100°C or 212°F. or above) and the hot water is under pressure (sometimes as high as 100 PSI). A rupture of the water channel or other contact with hot portions of this tube could scald or burn. Take precautions to prevent and avoid such rupture or contact.

HOT SURFACES

The anode portion of power tubes is often air-cooled or conduction-cooled. The air-cooled external surface normally operates at a high temperature (up to 200° to 300°C). Other portions of the tube may also reach high temperatures, especially the cathode insulator and the cathode/heater surfaces. All hot surfaces may remain hot for an extended time after the tube is shut off. To prevent serious burns, take care to prevent and avoid any bodily contact with these surfaces both during and for a reasonable cool-down period after tube operation.

4322 1/80 200M

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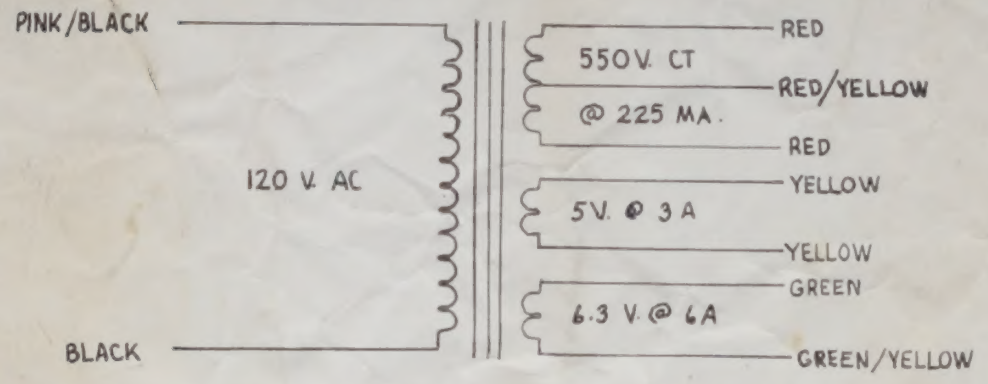
POWER TRANSFORMER T-416



OLSON ELECTRONICS INC. Akron, Ohio